

## **APPENDIX B**

### **DETAILED DOCUMENT REVIEW FINDINGS**

#### **Third-Party Verification Final Audit Report Second Audit**

Noble Energy, Inc.  
1625 Broadway, Suite 2200  
Denver, CO 80202

September 25, 2020

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S21 L01**

Consent Decree Tank System Number: **329**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S21 L01_FINAL PACKET	.pdf	8/3/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S21 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/14/2017	STEM Engineering Evaluation Spreadsheet
70 RANCH T5N-R63W-S21 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S21 L01_FINAL PACKET	.pdf	8/3/2015	Work Request
70 RANCH T5N-R63W-S21 L01_FINAL PACKET	.pdf	8/3/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S21 L01_FINAL PACKET	.pdf	8/3/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S21 L01_IR VERIFICATION	.pdf	7/24/2015	IR Verification Field Data Sheet
70 RANCH T5N-R63W-S21 L01_0179_NORMAL	.mp4	7/23/2015	IR Camera Video Normal Operations
70 RANCH T5N-R63W-S21 L01_0180_DUMP	.mp4	7/23/2015	IR Camera Video During Dump Event
70 RANCH T5N-R63W-S21 L01_0181_POST	.mp4	7/23/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S21 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **70 RANCH T5N-R63W-S21 L01**  
**Consent Decree Tank System Number:** **329**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>9</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>10,561</b>	<b>11,988</b>	<b>14%</b>
Calculated Burner Capacity (scfh)	<b>6,946</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>5,861</b>	<b>5,681</b>	
Total VCS Capacity (scfh)	<b>12,807</b>	<b>14,881</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,246</b>	<b>2,893</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 4/9/2018  
 Audit Document Review Verified by: C. Bock  
 Audit Document Verification Date: 7/3/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S21 L01**

Consent Decree Tank System Number: **329**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.80</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>162.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>l</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>51</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,753</b>	<b>6,753</b>
Oil Tank Working Rate	<b>569</b>	<b>568</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>2,140</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>11,988</b>	<b>10,561</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S21 L01**

Consent Decree Tank System Number: **329**

**Audit Notes**

CAB - It appears that breathing losses were not properly accounted for in the model because Noble considered only 3 of the 9 oil tanks in their evaluation. In reality all 9 tanks are produced to and would experience breathing losses that the vapor collection system will have to accommodate. The Modeling Guidance was not properly applied. For these reasons this site has been selected for IR camera inspection.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 Ranch T5N-R63W-S25 L02**

Consent Decree Tank System Number: **328**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S25 L02_FINAL PACKET	.pdf	8/27/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S25 L02_STEM Engineering Evaluation_rev1_with TLO (Oil)	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
193_70 RANCH T5N-R63W-S25 L02_STEM Engineering Evaluation_rev1_with TLO (Oil) - Update	.xlsm	10/11/2018	STEM Engineering Evaluation Spreadsheet - Revised
70 RANCH T5N-R63W-S25 L02_SIGNED EVAL (OIL)	.pdf	12/7/2017	Final Signed Engineering Evaluation
193_70 RANCH T5N-R63W-S25 L02_SIGNED EVAL (OIL)_Rev	.pdf	10/23/2018	Final Signed Engineering Evaluation - Revised

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S25 L02_FINAL PACKET	.pdf	8/27/2015	Work Request
70 RANCH T5N-R63W-S25 L02_FINAL PACKET	.pdf	8/27/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S25 L02_WALKDOWN	.pdf	8/26/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S25 L02_IR VERIFICATION	.pdf	8/26/2015	IR Verification Field Data Sheet
70 RANCH T5N-R63W-S25 L02_0010_NORMAL	.mp4	8/26/2015	IR Camera Video Normal Operations
70 RANCH T5N-R63W-S25 L02_0011_DUMP	.mp4	8/26/2015	IR Camera Video During Dump Event
70 RANCH T5N-R63W-S25 L02_0012_POST	.mp4	8/26/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S25 L02_SIGNED EVAL (OIL)	.pdf	12/7/2017	Final Signed Engineering Evaluation
193_70 RANCH T5N-R63W-S25 L02_SIGNED EVAL (OIL)_Rev	.pdf	10/23/2017	Final Signed Engineering Evaluation - Revised

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 Ranch T5N-R63W-S25 L02**

Consent Decree Tank System Number: **328**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>22,354</b>	<b>22,367</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,717</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>241,848</b>	<b>241,848</b>	
Total VCS Capacity (scfh)	<b>245,565</b>	<b>246,401</b>	
VCS Capacity minus PPIVF (scfh)	<b>223,211</b>	<b>224,034</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/19/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/19/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 Ranch T5N-R63W-S25 L02**

Consent Decree Tank System Number: **328**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	-0.90	-0.90						
Gas/Oil Ratio (scf/bbl)	22.9	22.9						

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	833	833						
Vapor Pressure (psia) <sup>c</sup>	407	407						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	6905	6905						

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	158.2	158.2						
Working Flow (Mscfd) <sup>h,i</sup>	66	66						

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>l</sup>	238	
Mscfd	29	

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	13,179	13,179
Oil Tank Working Rate	5,473	5,459
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	2,527	2,527
Total	22,367	22,354



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 Ranch T5N-R63W-S25 L02**

Consent Decree Tank System Number: **328**

**Audit Notes**

The NEI Engineering Evaluation was completed with 3" NPS for the Tanks to KO VCS piping, 4" NPS for the KO to Burner VCS piping, and 2" NPS for the Main Header to Burner Inlet VCS piping. Field Datasheets indicate the Tank to KO VCS piping is 4" NPS, KO to Burner VCS piping has an unknown NPS, and the Main Header to Burner Inlet VCS piping is 3" NPS. The Engineering Design Standard may not be strictly applied if the KO to Burner VCS piping is greater than 4" NPS.

NEI submitted a revised Engineering Evaluation on June 28, 2018 with 3" NPS for the Tanks to KO VCS piping, 3" NPS for the KO to Burner VCS piping, and 2" NPS for the Main Header to Burner Inlet VCS piping. The Engineering Evaluation and the Field Data indicate a conservative approach, thus the Engineering Design Standard appears to be appropriately applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S27 L01**

Consent Decree Tank System Number: **1883**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L01_FINAL PACKET	.pdf	12/22/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L01_STEM Engineering Evaluation_rev1	.xlsm	6/27/2017	STEM Engineering Evaluation Spreadsheet
70 RANCH T5N-R63W-S27 L01_SIGNED EVAL	.pdf	6/27/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L01_FINAL PACKET	.pdf	12/22/2015	Work Request
70 RANCH T5N-R63W-S27 L01_FINAL PACKET	.pdf	12/22/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L01_WALKDOWN	.pdf	12/16/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L01_IR VERIFICATION	.pdf	12/16/2015	IR Verification Field Data Sheet
70 RANCH T5N-R63W-S27 L01_0524_NORMAL	.mp4	12/16/2015	IR Camera Video Normal Operations
70 RANCH T5N-R63W-S27 L01_0525_DUMP	.mp4	12/16/2015	IR Camera Video During Dump Event
70 RANCH T5N-R63W-S27 L01_0526_POST	.mp4	12/16/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L01_SIGNED EVAL	.pdf	6/27/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **70 RANCH T5N-R63W-S27 L01**

**Consent Decree Tank System Number:** **1883**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,483</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>2,494</b>	<b>2,494</b>	
Total VCS Capacity (scfh)	<b>5,977</b>	<b>7,452</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,469</b>	<b>2,943</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/13/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S27 L01**

Consent Decree Tank System Number: **1883**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S27 L01**

Consent Decree Tank System Number: **1883**

**Audit Notes**

All documentation provided is consistent with itself and the Engineering Evaluation. No comments.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **70 RANCH T5N-R63W-S27 L02**

**Consent Decree Tank System Number:** **1337**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L02_FINAL PACKET	.pdf	4/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L02_STEM Engineering Evaluation_rev1	.xlsm	4/29/2016	STEM Engineering Evaluation Spreadsheet
70 RANCH T5N-R63W-S27 L02_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L02_FINAL PACKET	.pdf	4/29/2016	Work Request
70 RANCH T5N-R63W-S27 L02_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L02_FINAL PACKET	.pdf	4/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L02_IR VERIFICATION	.pdf	4/27/2016	IR Verification Field Data Sheet
70 RANCH T5N-R63W-S27 L02_0928_NORMAL	.mp4	4/27/2016	IR Camera Video Normal Operations
70 RANCH T5N-R63W-S27 L02_0929_DUMP	.mp4	4/27/2016	IR Camera Video During Dump Event
70 RANCH T5N-R63W-S27 L02_0930_POST	.mp4	4/27/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH T5N-R63W-S27 L02_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S27 L02**

Consent Decree Tank System Number: **1337**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,969</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>692</b>	<b>692</b>	
Total VCS Capacity (scfh)	<b>3,661</b>	<b>6,525</b>	
VCS Capacity minus PPIVF (scfh)	<b>593</b>	<b>3,456</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury

Audit Document Review Date: 4/9/2018

Audit Document Review Verified by: Nick Michaelson

Audit Document Verification Date: 4/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S27 L02**

Consent Decree Tank System Number: **1337**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	694							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	61.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,556	2,556
Oil Tank Working Rate	275	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,069</b>	<b>3,068</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH T5N-R63W-S27 L02**

Consent Decree Tank System Number: **1337**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 19-26) are not dated. Assumed the date is the same as Facility Scouting date (10/1/2015).

**2. Facility walkdown checklist (Final Packet, pg 43) marked complete**

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH USX T5N-R63W-S9 L02**

Consent Decree Tank System Number: **331**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L02_FINAL PACKET	.pdf	8/3/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L02_STEM Engineering Evaluation_with TLO	.xlsm	11/29/2017	STEM Engineering Evaluation Spreadsheet
70 RANCH USX T5N-R63W-S9 L02_SIGNED EVAL	.pdf	12/8/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L02_FINAL PACKET	.pdf	8/3/2015	Work Request
70 RANCH USX T5N-R63W-S9 L02_FINAL PACKET	.pdf	8/3/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L02_FINAL PACKET	.pdf	8/3/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L02_IR VERIFICATION	.pdf	7/28/2015	IR Verification Field Data Sheet
70 RANCH USX T5N-R63W-S9 L02_0182_NORMAL	.mp4	7/24/2015	IR Camera Video Normal Operations
70 RANCH USX T5N-R63W-S9 L02_0183_DUMP	.mp4	7/24/2015	IR Camera Video During Dump Event
70 RANCH USX T5N-R63W-S9 L02_0184_POST	.mp4	7/24/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L02_SIGNED EVAL	.pdf	12/8/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH USX T5N-R63W-S9 L02**

Consent Decree Tank System Number: **331**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>15,989</b>	<b>15,991</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,939</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>25,944</b>	<b>10,565</b>	
Total VCS Capacity (scfh)	<b>30,883</b>	<b>17,107</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,894</b>	<b>1,116</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 4/9/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 6/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH USX T5N-R63W-S9 L02**

Consent Decree Tank System Number: **331**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>15,991</b>	<b>15,989</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH USX T5N-R63W-S9 L02**

Consent Decree Tank System Number: **331**

**Audit Notes**

CB - Line size from tanks to KO: The system is constructed with two line sizes. A portion is 2" diameter and another portion is 3" diameter. The initial review and Noble's evaluation used the 3" diameter. To be conservative, for evaluation purposes, 2" was used for the VOC Line Size (Tanks to KO). The engineering design standard in this case has not be strictly followed.

The VOC line from the KO to the burners consists of two lines one that is 2" and one that is 3". The signed evaluation was completed with a 4" line. This is conservative because a 4" line has less flow area than the 3" and 2" line combined.

CB - Water tanks are not included in the analysis because they are not connected to vapor collection system.

This site has been selected for IR camera inspection due to th engineering design standard not being strictly followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** 70 RANCH USX T5N-R63W-S9 L05

**Consent Decree Tank System Number:** 330

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L05_COMPLETED TLO	.pdf	11/21/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L05_STEM Engineering Evaluation_rev1_with TLO	.xlsm	1/11/2018	STEM Engineering Evaluation Spreadsheet
70 RANCH USX T5N-R63W-S9 L05_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L05_FINAL PACKET	.pdf	11/21/2017	Work Request
70 RANCH USX T5N-R63W-S9 L05_FINAL PACKET	.pdf	11/21/2017	Construction Jobsheets
70 RANCH USX T5N-R63W-S9 L05_COMPLETED TLO	.pdf	11/21/2017	Completed TLO
226_70 RANCH USX T5N-R63W-S9 L05 Automation	.msg	5/15/2018	Completed Tank Control Verification Email

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L05_WALKDOWN	.pdf	7/20/2018	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L05_IR VERIFICATION	.pdf	7/28/2015	IR Verification Field Data Sheet
70 RANCH USX T5N-R63W-S9 L05_0185_NORMAL	.mp4	7/27/2015	IR Camera Video Normal Operations
70 RANCH USX T5N-R63W-S9 L05_0186_DUMP	.mp4	7/27/2015	IR Camera Video During Dump Event
70 RANCH USX T5N-R63W-S9 L05_0187_POST	.mp4	7/27/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
70 RANCH USX T5N-R63W-S9 L05_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **70 RANCH USX T5N-R63W-S9 L05**

**Consent Decree Tank System Number:** **330**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,035</b>	<b>7,036</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,661</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>6,418</b>	<b>5,661</b>	
Total VCS Capacity (scfh)	<b>12,079</b>	<b>17,328</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,044</b>	<b>10,292</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 12/11/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/17/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH USX T5N-R63W-S9 L05**

Consent Decree Tank System Number: **330**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,036</b>	<b>7,035</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **70 RANCH USX T5N-R63W-S9 L05**

Consent Decree Tank System Number: **330**

**Audit Notes**

There is no request to limit tank fill levels to 75% in either the Work Order request or the TLO documentation. The evaluation was completed with tanks limited to 75%.

Noble provided additional information including an email chain, beginning on January 12, 2018, confirming the "Tank kill set is at 75% in all four oil tanks and shuts in both wells." The provided documentation confirms the appropriate application of the Engineering Design Standard.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ABBEY GUTTERSEN T3N-R64W-S1 L01**

Consent Decree Tank System Number: **539/2119**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_FINAL PACKET	.pdf	12/13/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_SIGNED EVAL	.pdf	12/20/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_FINAL PACKET	.pdf	12/13/2017	Work Request
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_FINAL PACKET	.pdf	12/13/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_IR VERIFICATION	.pdf	11/29/2017	IR Verification Field Data Sheet
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_0041_NORMAL	.mp4	11/29/2017	IR Camera Video Normal Operations
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_0042_DUMP	.mp4	11/29/2017	IR Camera Video During Dump Event
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_0043_POST	.mp4	11/29/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ABBEY GUTTERSEN T3N-R64W-S1 L01 & HSR GUTTERSEN T3N-R64W-S1 L02_SIGNED EVAL	.pdf	12/20/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ABBEY GUTTERSEN T3N-R64W-S1 L01  
**Consent Decree Tank System Number:** 539/2119

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>9,139</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,145</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>18,963</b>	<b>18,963</b>	
Total VCS Capacity (scfh)	<b>23,108</b>	<b>23,563</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,329</b>	<b>14,424</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/19/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ABBEY GUTTERSEN T3N-R64W-S1 L01**

Consent Decree Tank System Number: **539/2119**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>l</sup>	238	0
Mscfd	17	0

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	9,139	8,779

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ABBEY GUTTERSEN T3N-R64W-S1 L01**

Consent Decree Tank System Number: **539/2119**

**Audit Notes**

The Work Request indicated the oil dump valves on Separators 3 & 4 were to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on either separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size. A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C14, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

Noble provided information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 9/25/2017, field verification confirmed that one tank was converted to a headspace tank." The Engineering Design Standard has been appropriately applied based on the field verification data provided.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ACHZIGER T6N-R64W-S33 L01**

Consent Decree Tank System Number: **2219**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ACHZIGER T6N-R64W-S33 L01_FINAL PACKET	.pdf	12/8/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ACHZIGER T6N-R64W-S33 L01_STEM Engineering Evaluation_rev1	.xls	1/30/2017	STEM Engineering Evaluation Spreadsheet
ACHZIGER T6N-R64W-S33 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ACHZIGER T6N-R64W-S33 L01_FINAL PACKET	.pdf	12/8/2017	Work Request
ACHZIGER T6N-R64W-S33 L01_FINAL PACKET	.pdf	12/8/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ACHZIGER T6N-R64W-S33 L01_FINAL PACKET	.pdf	12/8/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ACHZIGER T6N-R64W-S33 L01_IR VERIFICATION	.pdf	1/24/2017	IR Verification Field Data Sheet
ACHZIGER T6N-R64W-S33 L01_0062_NORMAL	.mp4	1/20/2017	IR Camera Video Normal Operations
ACHZIGER T6N-R64W-S33 L01_0063_DUMP	.mp4	1/20/2017	IR Camera Video During Dump Event
ACHZIGER T6N-R64W-S33 L01_0064_POST	.mp4	1/20/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ACHZIGER T6N-R64W-S33 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ACHZIGER T6N-R64W-S33 L01**

Consent Decree Tank System Number: **2219**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>475</b>	<b>475</b>	
Total VCS Capacity (scfh)	<b>4,502</b>	<b>5,433</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,058</b>	<b>1,989</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/20/2018  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 4/23/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ACHZIGER T6N-R64W-S33 L01**

Consent Decree Tank System Number: **2219**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,445</b>	<b>3,444</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ACHZIGER T6N-R64W-S33 L01**

Consent Decree Tank System Number: **2219**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 12-19) are not dated. Assumed the date is the same as Facility Scouting date (7/21/2015).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ACHZIGER ZEHNDER T5N-R64W-S5 L01**

Consent Decree Tank System Number: **1025**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ACHZIGER ZEHNDER T5N-R64W-S5 L01_FINAL PACKET	.pdf	9/9/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ACHZIGER ZEHNDER T5N-R64W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	6/20/2017	STEM Engineering Evaluation Spreadsheet
ACHZIGER ZEHNDER T5N-R64W-S5 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ACHZIGER ZEHNDER T5N-R64W-S5 L01_FINAL PACKET	.pdf	9/9/2015	Work Request
ACHZIGER ZEHNDER T5N-R64W-S5 L01_FINAL PACKET	.pdf	9/9/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ACHZIGER ZEHNDER T5N-R64W-S5 L01_FINAL PACKET	.pdf	9/9/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ACHZIGER ZEHNDER T5N-R64W-S5 L01_IR VERIFICATION	.pdf	9/8/2015	IR Verification Field Data Sheet
ACHZIGER ZEHNDER T5N-R64W-S5 L01_0193_NORMAL	.mp4	9/2/2015	IR Camera Video Normal Operations
ACHZIGER ZEHNDER T5N-R64W-S5 L01_0194_DUMP	.mp4	9/2/2015	IR Camera Video During Dump Event
ACHZIGER ZEHNDER T5N-R64W-S5 L01_0195_POST	.mp4	9/2/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ACHZIGER ZEHNDER T5N-R64W-S5 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ACHZIGER ZEHNDER T5N-R64W-S5 L01**

Consent Decree Tank System Number: **1025**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>275</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>16,611</b>	<b>16,612</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,961</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>18,024</b>	<b>18,024</b>	
Total VCS Capacity (scfh)	<b>22,985</b>	<b>24,566</b>	
VCS Capacity minus PPIVF (scfh)	<b>6,374</b>	<b>7,953</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/20/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ACHZIGER ZEHNDER T5N-R64W-S5 L01**

Consent Decree Tank System Number: **1025**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>2.12</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>2.23</b>							
Gas/Oil Ratio (scf/bbl)	<b>682.1</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>2.17</b>							
Critical Pressure (psia) <sup>b</sup>	<b>722</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>288</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.78</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>560</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>382.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>5</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

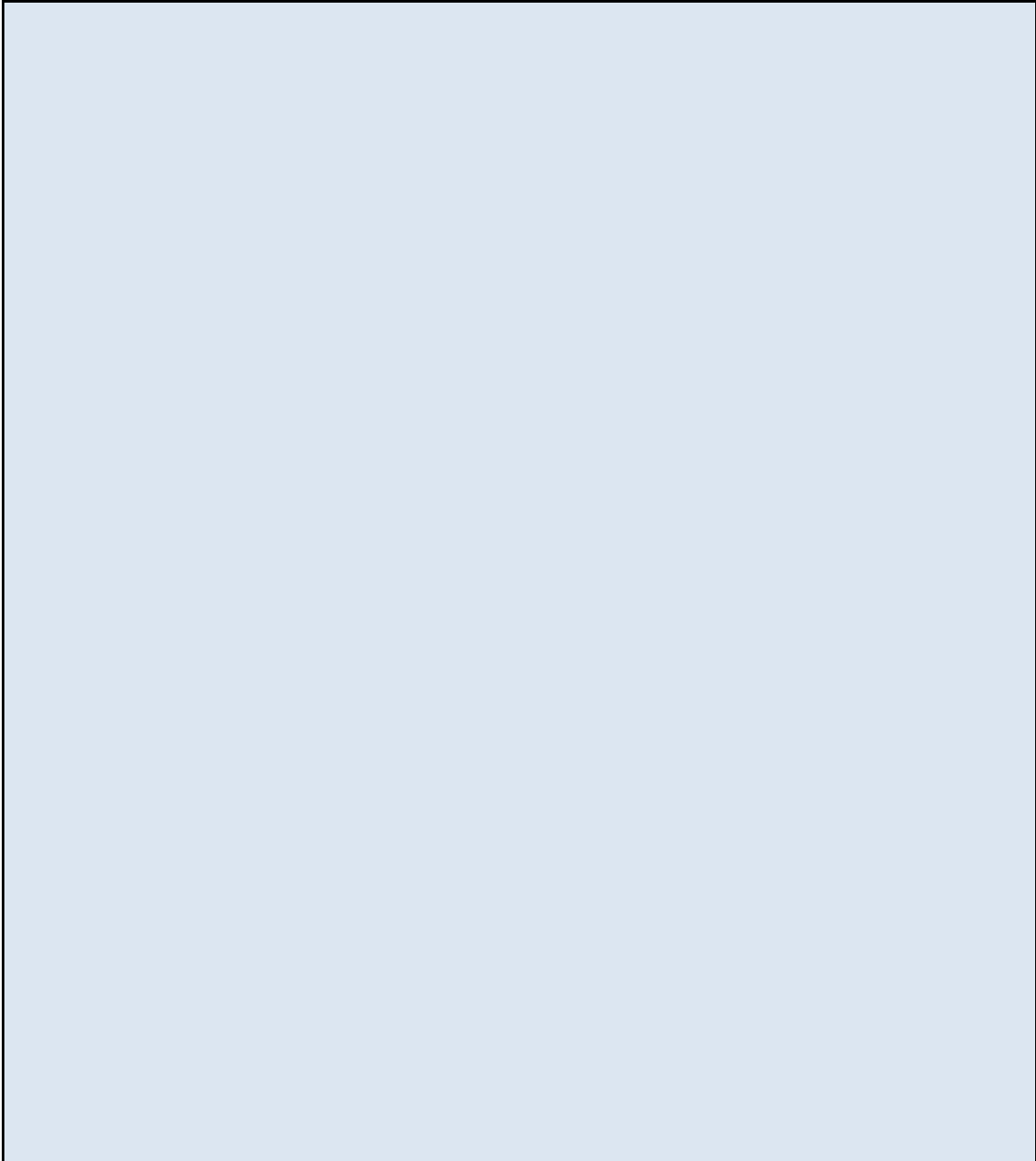
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>15,915</b>	<b>15,915</b>
Oil Tank Working Rate	<b>222</b>	<b>221</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>16,612</b>	<b>16,611</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ACHZIGER ZEHNDER T5N-R64W-S5 L01**

Consent Decree Tank System Number: **1025**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ADLER LOCKMAN T4N-R64W-S10 L01**

Consent Decree Tank System Number: **634**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ADLER LOCKMAN T4N-R64W-S10 L01_FINAL PACKET	.pdf	1/4/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ADLER LOCKMAN T4N-R64W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	8/17/2016	STEM Engineering Evaluation Spreadsheet
ADLER LOCKMAN T4N-R64W-S10 L01_SIGNED EVAL	.pdf	8/4/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ADLER LOCKMAN T4N-R64W-S10 L01_FINAL PACKET	.pdf	1/19/2016	Work Request
ADLER LOCKMAN T4N-R64W-S10 L01_FINAL PACKET	.pdf	6/13/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ADLER LOCKMAN T4N-R64W-S10 L01_WALKDOWN	.pdf	7/21/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ADLER LOCKMAN T4N-R64W-S10 L01_IR VERIFICATION	.pdf	7/22/2016	IR Verification Field Data Sheet
ADLER LOCKMAN T4N-R64W-S10 L01_1318_NORMAL	.mp4	7/21/2016	IR Camera Video Normal Operations
ADLER LOCKMAN T4N-R64W-S10 L01_1319_DUMP	.mp4	7/21/2016	IR Camera Video During Dump Event
ADLER LOCKMAN T4N-R64W-S10 L01_1320_POST	.mp4	7/21/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ADLER LOCKMAN T4N-R64W-S10 L01_SIGNED EVAL	.pdf	8/4/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ADLER LOCKMAN T4N-R64W-S10 L01**

**Consent Decree Tank System Number:** **634**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,222</b>	<b>5,222</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,081</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>26,163</b>	<b>26,163</b>	
Total VCS Capacity (scfh)	<b>29,244</b>	<b>30,763</b>	
VCS Capacity minus PPIVF (scfh)	<b>24,022</b>	<b>25,541</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 3/30/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/11/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ADLER LOCKMAN T4N-R64W-S10 L01**

Consent Decree Tank System Number: **634**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>29</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>5,222</b>	<b>5,222</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ADLER LOCKMAN T4N-R64W-S10 L01**

Consent Decree Tank System Number: **634**

**Audit Notes**

-The Work Request indicates 1 oil tank should be disconnected from the fill header in order to be used for headspace. The Jobsheet indicates one tank was bottomed out, but the Walkdown Checklist is checked "yes" for all tank fill lines produced to all tanks (C13). Noble verified in a data request dated 8/14/2018 that the tank was properly disconnected to be used for headspace on or around 6/21/2016.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01**

Consent Decree Tank System Number: **2133**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_FINAL PACKET	.pdf	7/24/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	7/25/2017	STEM Engineering Evaluation Spreadsheet
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_Final Signed STEM Plan	.pdf	10/11/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_FINAL PACKET	.pdf	7/24/2017	Work Request
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_FINAL PACKET	.pdf	7/24/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_WALKDOWN	.pdf	7/24/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_IR VERIFICATION	.pdf	7/21/2017	IR Verification Field Data Sheet
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_2154_NORMAL	.mp4	7/20/2017	IR Camera Video Normal Operations
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_2155_DUMP	.mp4	7/20/2017	IR Camera Video During Dump Event
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_2156_POST	.mp4	7/20/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01_SIGNED EVAL	.pdf	8/1/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01**

**Consent Decree Tank System Number:** **2133**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>2,389</b>	<b>2,389</b>	
Total VCS Capacity (scfh)	<b>6,387</b>	<b>7,347</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,305</b>	<b>3,264</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 7/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01**

Consent Decree Tank System Number: **2133**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALBERT GRASSHOPPER ASHLEY BENIRSCHKE RITCHEY T3N-R65W-S23 L01**

Consent Decree Tank System Number: **2133**

**Audit Notes**

The walkdown checklist is not marked complete.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALEXANDER T5N-R65W-S33 L01**

Consent Decree Tank System Number: **264**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ALEXANDER T5N-R65W-S33 L01_FINAL PACKET	.pdf	4/8/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ALEXANDER T5N-R65W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	4/12/2016	STEM Engineering Evaluation Spreadsheet
ALEXANDER T5N-R65W-S33 L01_SIGNED EVAL	.pdf	4/16/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ALEXANDER T5N-R65W-S33 L01_FINAL PACKET	.pdf	4/8/2016	Work Request
ALEXANDER T5N-R65W-S33 L01_FINAL PACKET	.pdf	4/8/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ALEXANDER T5N-R65W-S33 L01_WALKDOWN	.pdf	4/8/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ALEXANDER T5N-R65W-S33 L01_IR VERIFICATION	.pdf	4/8/2016	IR Verification Field Data Sheet
ALEXANDER T5N-R65W-S33 L01_0837_NORMAL	.mp4	4/6/2016	IR Camera Video Normal Operations
ALEXANDER T5N-R65W-S33 L01_0838_DUMP	.mp4	4/6/2016	IR Camera Video During Dump Event
ALEXANDER T5N-R65W-S33 L01_0839_POST	.mp4	4/6/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ALEXANDER T5N-R65W-S33 L01_SIGNED EVAL	.pdf	4/16/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALEXANDER T5N-R65W-S33 L01**

Consent Decree Tank System Number: **264**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,022</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>17,958</b>	<b>24,575</b>	
Total VCS Capacity (scfh)	<b>21,980</b>	<b>29,175</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,234</b>	<b>24,428</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 12/28/20147  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 2/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALEXANDER T5N-R65W-S33 L01**

Consent Decree Tank System Number: **264**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALEXANDER T5N-R65W-S33 L01**

Consent Decree Tank System Number: **264**

**Audit Notes**

Provided STEM Engineering Evaluation calculations completed with 3 oil tanks at 68% capacity. Corrected to 4 oil tanks at 68% capacity to correctly account for headspace tank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALLELEY T5N-R66W-S34 L01**

Consent Decree Tank System Number: **2178**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ALLELEY T5N-R66W-S34 L01_FINAL PACKET	.pdf	1/16/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ALLELEY T5N-R66W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	1/17/2017	STEM Engineering Evaluation Spreadsheet
ALLELEY T5N-R66W-S34 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ALLELEY T5N-R66W-S34 L01_FINAL PACKET	.pdf	1/16/2017	Work Request
ALLELEY T5N-R66W-S34 L01_FINAL PACKET	.pdf	1/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ALLELEY T5N-R66W-S34 L01_WALKDOWN	.pdf	1/16/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ALLELEY T5N-R66W-S34 L01_IR VERIFICATION	.pdf	1/15/2017	IR Verification Field Data Sheet
ALLELEY T5N-R66W-S34 L01_0438_NORMAL	.mp4	1/11/2017	IR Camera Video Normal Operations
ALLELEY T5N-R66W-S34 L01_0439_DUMP	.mp4	1/11/2017	IR Camera Video During Dump Event
ALLELEY T5N-R66W-S34 L01_0440_POST	.mp4	1/11/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ALLELEY T5N-R66W-S34 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALLELEY T5N-R66W-S34 L01**

Consent Decree Tank System Number: **2178**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>539</b>	<b>539</b>	
Total VCS Capacity (scfh)	<b>4,566</b>	<b>5,497</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,122</b>	<b>1,910</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper

Audit Document Review Date: 7/30/2018

Audit Document Review Verified by: Angela Oberlander

Audit Document Verification Date: 10/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALLELEY T5N-R66W-S34 L01**

Consent Decree Tank System Number: **2178**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALLELEY T5N-R66W-S34 L01**

Consent Decree Tank System Number: **2178**

**Audit Notes**

The work request asked that the low pressure separator maximum normal operating pressure be set to 60 psig. However, there was no documentation confirming that this work had been completed. Noble was asked to provide sufficient documentation proving that the low pressure separator was set to 60 psig. The following is NEI response to the request for data. "The 'STEM Work Request Form' (Final Packet - page 4), 'STEM Design Confirmation Form' (Final Packet - page 9), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure changed to 60 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.'" Per Noble's response to the data request it is possible to confirm that the Engineering Design Standard was followed.

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01

**Consent Decree Tank System Number:** 2294

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_FINAL PACKET	.pdf	8/31/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_STEM ENGINEERING EVALUATION_REV1	.pdf	5/3/2017	STEM Engineering Evaluation Spreadsheet
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_SIGNED EVAL	.xlsm		Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_FINAL PACKET	.pdf	3/8/2017	Work Request
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_FINAL PACKET	.pdf	4/14/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_FINAL PACKET	.pdf	5/1/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_FINAL PACKET	.pdf	5/1/2017	IR Verification Field Data Sheet
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_1999_NORMAL	.mp4	5/1/2017	IR Camera Video Normal Operations
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_2000_DUMP	.mp4	5/1/2017	IR Camera Video During Dump Event
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_2001_POST	.mp4	5/1/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01_SIGNED EVAL	.pdf	5/3/2017	Final Signed Engineering Evaluation

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01

**Consent Decree Tank System Number:** 2294

<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	2" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,194	3,195	0%
Calculated Burner Capacity (scfh)	4,027	5,833	
Headspace Surge Capacity (scfh)	306	306	
Total VCS Capacity (scfh)	4,333	6,139	
VCS Capacity minus PPIVF (scfh)	1,139	2,945	

<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:	Justin Frahm
Audit Document Review Date:	11/5/2017
Audit Document Review Verified by:	James Van Horne
Audit Document Verification Date:	11/6/2017

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01**

Consent Decree Tank System Number: **2294**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (k)	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (k)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,670</b>
Oil Tank Working Rate	<b>287</b>	<b>286</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,194</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ALLES JOHN HOFF LOEFFLER T5N-R65W-S27 L01

**Consent Decree Tank System Number:** 2294

**Audit Notes**

Facility datasheet has no date on it but data matches aerial photos and makes sense given work order and job sheet content. Assuming that facility data comes from before work order.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALLES T5N-R65W-S33 L06**

Consent Decree Tank System Number: **267**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ALLES T5N-R65W-S33 L06_FINAL PACKET	.pdf	9/9/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ALLES T5N-R65W-S33 L06_STEM Engineering Evaluation_rev1	.xlsm	12/15/2016	STEM Engineering Evaluation Spreadsheet
ALLES T5N-R65W-S33 L06_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ALLES T5N-R65W-S33 L06_FINAL PACKET	.pdf	9/9/2015	Work Request
ALLES T5N-R65W-S33 L06_FINAL PACKET	.pdf	9/9/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ALLES T5N-R65W-S33 L06_WALKDOWN	.pdf	9/9/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ALLES T5N-R65W-S33 L06_IR VERIFICATION	.pdf	9/8/2015	IR Verification Field Data Sheet
ALLES T5N-R65W-S33 L06_0188_NORMAL	.mp4	9/2/2015	IR Camera Video Normal Operations
ALLES T5N-R65W-S33 L06_0189_DUMP	.mp4	9/2/2015	IR Camera Video During Dump Event
ALLES T5N-R65W-S33 L06_0190_POST	.mp4	9/2/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ALLES T5N-R65W-S33 L06_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ALLES T5N-R65W-S33 L06

**Consent Decree Tank System Number:** 267

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,986</b>	<b>2,986</b>	
Total VCS Capacity (scfh)	<b>5,712</b>	<b>8,819</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,630</b>	<b>4,736</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 12/28/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 2/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALLES T5N-R65W-S33 L06**

Consent Decree Tank System Number: **267**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

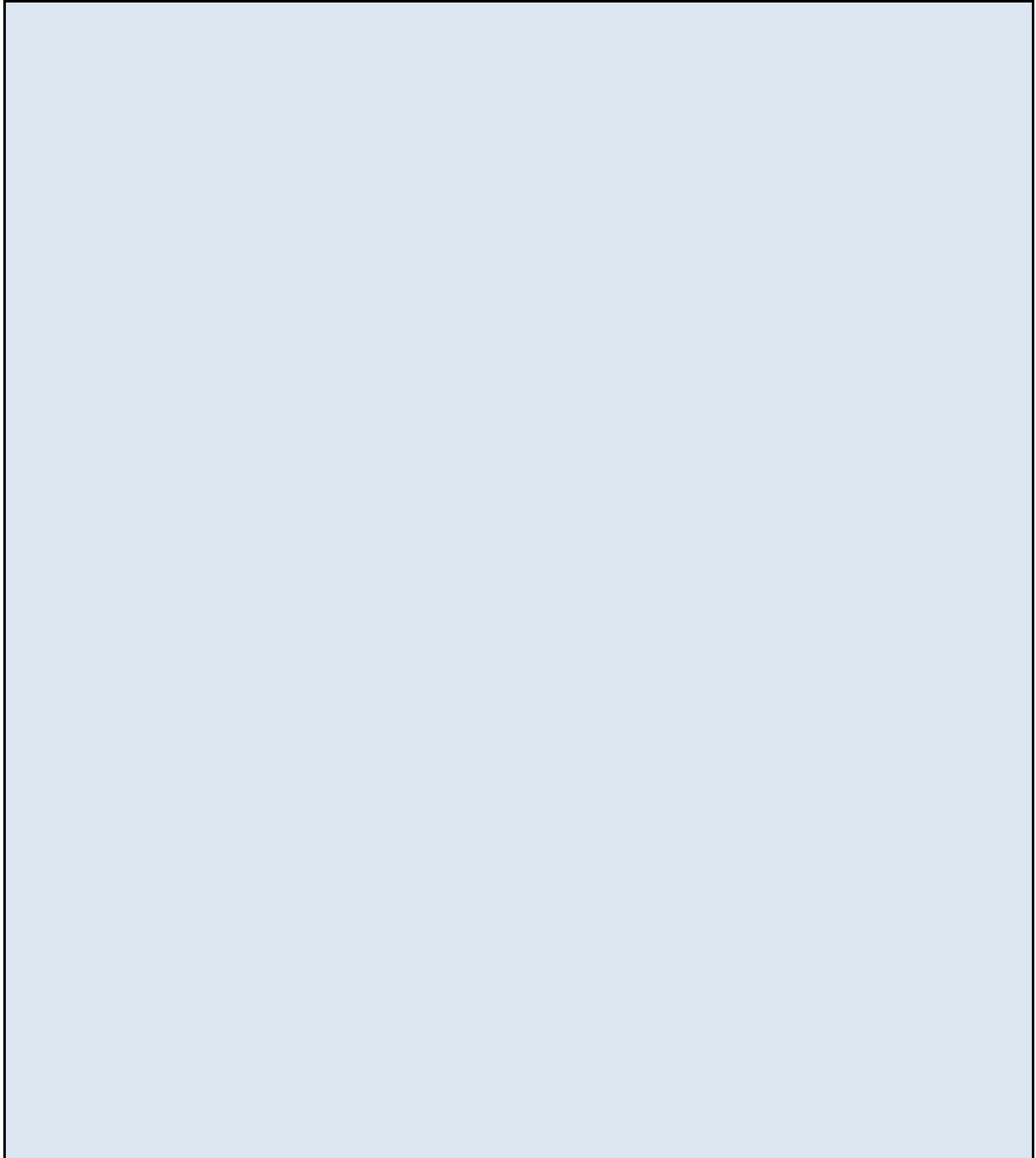
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALLES T5N-R65W-S33 L06**

Consent Decree Tank System Number: **267**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALOYSIUS 2E RANCHES T4N-R64W-S34 L01**

Consent Decree Tank System Number: **518**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_FINAL PACKET	.pdf	12/21/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	11/30/2016	STEM Engineering Evaluation Spreadsheet
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_SIGNED EVAL	.pdf	12/8/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_FINAL PACKET	.pdf	8/10/2016	Work Request
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_FINAL PACKET	.pdf	9/13/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_WALKDOWN	.pdf	12/5/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_IR VERIFICATION	.pdf	11/30/2016	IR Verification Field Data Sheet
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_1747_NORMAL	.mp4	11/28/2016	IR Camera Video Normal Operations
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_1748_DUMP	.mp4	11/28/2016	IR Camera Video During Dump Event
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_1749_POST	.mp4	11/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ALOYSIUS 2E RANCHES T4N-R64W-S34 L01_SIGNED EVAL	.pdf	12/8/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ALOYSIUS 2E RANCHES T4N-R64W-S34 L01**

**Consent Decree Tank System Number:** **518**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,320</b>	<b>4,481</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>3,061</b>	<b>3,061</b>	
Total VCS Capacity (scfh)	<b>7,116</b>	<b>7,661</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,796</b>	<b>3,180</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 3/30/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 4/24/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALOYSIUS 2E RANCHES T4N-R64W-S34 L01**

Consent Decree Tank System Number: **518**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	794							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	82.9							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,454	3,307
Oil Tank Working Rate	314	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	4,481	4,320



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALOYSIUS 2E RANCHES T4N-R64W-S34 L01**

Consent Decree Tank System Number: **518**

**Audit Notes**

-Job sheet lists PSHH was set to 55 psig. QC Stem Checkout on Page 33 of the Final Packet lists 65 psig as the setpoint. 65 psig will result in a higher PPIVFR and is consistent with the Signed Evaluation.

-The Work Request indicated the oil dump valve was to be modified to Kimray 1400 with 1/2 inch trim. Could not verify the oil dump valve size (2" or 1") on either separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALOYSIUS T4N-R64W-S34 L01**

Consent Decree Tank System Number: **484**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ALOYSIUS T4N-R64W-S34 L01_FINAL PACKET	.pdf	12/15/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ALOYSIUS T4N-R64W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
ALOYSIUS T4N-R64W-S34 L01_SIGNED EVAL	.pdf	12/20/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ALOYSIUS T4N-R64W-S34 L01_FINAL PACKET	.pdf	12/15/2017	Work Request
ALOYSIUS T4N-R64W-S34 L01_FINAL PACKET	.pdf	12/15/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ALOYSIUS T4N-R64W-S34 L01_WALKDOWN	.pdf	11/29/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ALOYSIUS T4N-R64W-S34 L01_IR VERIFICATION	.pdf	11/29/2017	IR Verification Field Data Sheet
ALOYSIUS T4N-R64W-S34 L01_0046_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
ALOYSIUS T4N-R64W-S34 L01_0047_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
ALOYSIUS T4N-R64W-S34 L01_0048_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ALOYSIUS T4N-R64W-S34 L01_SIGNED EVAL	.pdf	12/20/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ALOYSIUS T4N-R64W-S34 L01**

**Consent Decree Tank System Number:** **484**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>5,164</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,934</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>6,706</b>	<b>6,706</b>	
Total VCS Capacity (scfh)	<b>9,640</b>	<b>12,539</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,656</b>	<b>7,375</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALOYSIUS T4N-R64W-S34 L01**

Consent Decree Tank System Number: **484**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,164</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ALOYSIUS T4N-R64W-S34 L01**

Consent Decree Tank System Number: **484**

**Audit Notes**

**1. Oil Dump Valve Size - Unknown**

QC STEM Checkout form (Final Packet, pg 27) indicates a separator with SN: 8522 is the LP separator which dumps to the tanks. ITEM A1 of the STEM Walkdown Checklist is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation, and is therefore 1/2". No other documentation is provided to indicate what size oil dump valve is installed in this separator.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the LP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly followed. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AMIGO FUEGO T4N-R64W-S1 L01**

Consent Decree Tank System Number: **712**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
AMIGO FUEGO T4N-R64W-S1 L01_FINAL PACKET	.pdf	3/30/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
AMIGO FUEGO T4N-R64W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
AMIGO FUEGO T4N-R64W-S1 L01_SIGNED EVAL	.pdf	4/4/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
AMIGO FUEGO T4N-R64W-S1 L01_FINAL PACKET	.pdf	3/30/2017	Work Request
AMIGO FUEGO T4N-R64W-S1 L01_FINAL PACKET	.pdf	3/30/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
AMIGO FUEGO T4N-R64W-S1 L01_WALKDOWN	.pdf	3/27/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
AMIGO FUEGO T4N-R64W-S1 L01_IR VERIFICATION UPDATED	.pdf	5/29/2018	IR Verification Field Data Sheet
AMIGO FUEGO T4N-R64W-S1 L01_0014_NORMAL UPDATED	.mp4	7/11/2018	IR Camera Video Normal Operations
AMIGO FUEGO T4N-R64W-S1 L01_0015_DUMP UPDATED	.mp4	7/11/2018	IR Camera Video During Dump Event
AMIGO FUEGO T4N-R64W-S1 L01_0016_POST UPDATED	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
AMIGO FUEGO T4N-R64W-S1 L01_SIGNED EVAL	.pdf	4/4/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AMIGO FUEGO T4N-R64W-S1 L01**

Consent Decree Tank System Number: **712**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>120</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,618</b>	<b>5,949</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>7,602</b>	<b>9,917</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>7,602</b>	<b>9,917</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,984</b>	<b>3,967</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/18/2018 & 11/26/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AMIGO FUEGO T4N-R64W-S1 L01**

Consent Decree Tank System Number: **712**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.34							
Z2	-0.86							
Z3	0.98							
Z	1.46							
Gas/Oil Ratio (scf/bbl)	209.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	4.04							
Critical Pressure (psia) <sup>b</sup>	584							
Vapor Pressure (psia) <sup>c</sup>	133							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.83							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	625							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	131.1							
Working Flow (Mscfd) <sup>h,i</sup>	6							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	5,464	5,147
Oil Tank Working Rate	248	233
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	5,949	5,618



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AMIGO FUEGO T4N-R64W-S1 L01**

Consent Decree Tank System Number: **712**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 8-13) are not dated. Date assumed to be same as Facility Scouting Date (4/29/2016).

**2. Diameter of VOC line from tank to KO - Request additional information**

The STEM Work Request Form (Final Packet, pg 3) requests that the existing 2" VOC line be replaced with a 3" VOC line from the tanks to KO pot. The Engineering Evaluation shows a 3" VOC line from tanks to KO onsite.

No documentation is provided that indicates the 3" VOC line from tanks to KO was installed onsite. If a 2" VOC line does still exist onsite and not a 3", then the control system capacity is being overestimated and the Engineering Design Standard is not being followed.

**Request confirmation of Knockout to Burner VOC line size.**

**UPDATE 11/26/2018 - Noble confirmed via data request a 3" VOC line from the tanks to the KO was installed and is currently onsite. The Engineering Design Standard is being followed correctly.**

**3. Tank Design & Engineering Controls - Tank Liquid Level**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity should have been used for this analysis and the Engineering Design Standard has not been strictly applied.

**4. Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 18) indicates a new separator was installed onsite and ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 23) is checked "yes" indicating the oil dump trim is consistent with the Engineering Evaluation, and is therefore 3/8". There is no indication of the oil dump valve size installed in the separator onsite.

A 1" oil dump valve is used in the Engineering Evaluation. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**5. Separator Operating Pressure - Request additional data**

The Engineering Evaluation indicates the separator is set to operate at 120 psig, no documentation was provided to indicate the separator onsite is set to operate at 120 psig.

**Confirm with Noble the separator operating pressure onsite is 120 psig.**

**UPDATE 11/26/2018 - Noble confirmed via data request the maximum separator operating pressure was set to no higher than 120 psig as requested.**

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AMIGO UHRICH GULLEY T6N-R64W-S17 L01**

Consent Decree Tank System Number: **603**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_FINAL PACKET	.pdf	10/30/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_SIGNED EVAL	.pdf	1/11/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_FINAL PACKET	.pdf	10/30/2015	Work Request
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_FINAL PACKET	.pdf	10/30/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_WALKDOWN	.pdf	10/26/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_0380_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_0381_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_0382_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
AMIGO UHRICH GULLEY T6N-R64W-S17 L01_SIGNED EVAL	.pdf	1/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **AMIGO UHRICH GULLEY T6N-R64W-S17 L01**

**Consent Decree Tank System Number:** **603**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,364</b>	<b>2,364</b>	
Total VCS Capacity (scfh)	<b>5,090</b>	<b>8,197</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,785</b>	<b>4,891</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AMIGO UHRICH GULLEY T6N-R64W-S17 L01**

Consent Decree Tank System Number: **603**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	694							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	61.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,556	2,556
Oil Tank Working Rate	275	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AMIGO UHRICH GULLEY T6N-R64W-S17 L01**

Consent Decree Tank System Number: **603**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 3-8) are not dated. Date assumed to be same as Facility Scouting Date (8/25/2015).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSEN HEADLEY LARSON T4N-R65W-S33-L01**

Consent Decree Tank System Number: **2328**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_FINAL PA	PDF	6/24/2016	Field Datasheet

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_SIGNED	PDF	6/27/2016	Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_FINAL PA	PDF	6/24/2016	Job Sheet
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_FINAL PA	PDF	5/31/2016	STEM Work Request Form

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_WALKDOWN	PDF	6/23/2016	Walkdown

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_IR VERIFICATION	PDF	6/23/2016	IR Camera Verification Documentation
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_NORMAL	MP4	6/23/2016	IR Verification Video Normal
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_DUMP	MP4	6/23/2016	IR Verification Video Dump
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_POST	MP4	6/23/2016	IR Verification Video Post

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON HEADLEY LARSON T4N-R65W-S33 LO1_SIGNED	PDF	6/27/2016	Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSEN HEADLEY LARSON T4N-R65W-S33-L01**  
**Consent Decree Tank System Number:** **2328**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,706</b>	<b>2,706</b>	
Total VCS Capacity (scfh)	<b>5,633</b>	<b>8,539</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,952</b>	<b>4,857</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Alex Asbury  
 Audit Document Review Date: \_\_\_\_\_ 11/6/2017  
 Audit Document Review Verified by: \_\_\_\_\_ Craig Bock  
 Audit Document Verification Date: \_\_\_\_\_ 12/19/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSEN HEADLEY LARSON T4N-R65W-S33-L01**

Consent Decree Tank System Number: **2328**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>



## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSEN HEADLEY LARSON T4N-R65W-S33-L01**

Consent Decree Tank System Number: **2328**

### Audit Notes

The Job Sheet describes "the tanks were left with the HP being able to dump to both tanks, there was no head space tank left in the end, due to changes being made by production". Leaving the HP oil dumps connected to the tank fill header is contrary to STEM Work Request Item #2 of the Separator/Flowlines/Comingles section that requests "Disconnect HP oil dump from tank fill line". The Noble model doesn't consider a HP oil dump to the oil tanks. Field verification for this facility was completed on or around 6/20/2016, field verification confirmed that the HP separator oil dump was routed to the LP separator.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSEN HSR MINTON T4N-R65W-S33 L01**

Consent Decree Tank System Number: **2287**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ANDERSEN HSR MINTON T4N-R65W-S33 L01_FINAL PACKET	.pdf	6/9/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ANDERSEN HSR MINTON T4N-R65W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	6/14/2017	STEM Engineering Evaluation Spreadsheet
ANDERSEN HSR MINTON T4N-R65W-S33 L01_Final Signed STEM Plan	.pdf	7/30/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSEN HSR MINTON T4N-R65W-S33 L01_FINAL PACKET	.pdf	6/9/2017	Work Request
ANDERSEN HSR MINTON T4N-R65W-S33 L01_FINAL PACKET	.pdf	6/9/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ANDERSEN HSR MINTON T4N-R65W-S33 L01_WALKDOWN	.pdf	6/9/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSEN HSR MINTON T4N-R65W-S33 L01_IR VERIFICATION	.pdf	6/8/2017	IR Verification Field Data Sheet
ANDERSEN HSR MINTON T4N-R65W-S33 L01_2102_NORMAL	.mp4	6/6/2017	IR Camera Video Normal Operations
ANDERSEN HSR MINTON T4N-R65W-S33 L01_2103_DUMP	.mp4	6/6/2017	IR Camera Video During Dump Event
ANDERSEN HSR MINTON T4N-R65W-S33 L01_2104_POST	.mp4	6/6/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ANDERSEN HSR MINTON T4N-R65W-S33 L01_SIGNED EVAL	.pdf	6/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSEN HSR MINTON T4N-R65W-S33 L01**

**Consent Decree Tank System Number:** **2287**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>370</b>	<b>370</b>	
Total VCS Capacity (scfh)	<b>4,590</b>	<b>4,970</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,146</b>	<b>1,525</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 11/13/2017  
 Audit Document Review Verified by: JESSE HANSHAW  
 Audit Document Verification Date: 12/10/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSEN HSR MINTON T4N-R65W-S33 L01**

Consent Decree Tank System Number: **2287**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	3,445	3,444

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSEN HSR MINTON T4N-R65W-S33 L01**

Consent Decree Tank System Number: **2287**

**Audit Notes**

The walkdown checklist is not marked complete.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01**

**Consent Decree Tank System Number:** **2207**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_FINAL PACKET	.pdf	11/10/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_STEM Engineering Evaluation_rev1	.xlsm	1/5/2018	STEM Engineering Evaluation Spreadsheet
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_SIGNED EVAL	.pdf	11/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_FINAL PACKET	.pdf	11/10/2016	Work Request
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_FINAL PACKET	.pdf	11/10/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_FINAL PACKET	.pdf	11/10/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_IR VERIFICATION	.pdf	11/2/2016	IR Verification Field Data Sheet
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_1035_NORMAL	.mp4	11/1/2016	IR Camera Video Normal Operations
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_1036_DUMP	.mp4	11/1/2016	IR Camera Video During Dump Event
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_1037_POST	.mp4	11/1/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01_SIGNED EVAL	.pdf	11/15/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01**

**Consent Decree Tank System Number:** **2207**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>286</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,834</b>	<b>3,834</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,124</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>488</b>	<b>488</b>	
Total VCS Capacity (scfh)	<b>4,612</b>	<b>5,088</b>	
VCS Capacity minus PPIVF (scfh)	<b>778</b>	<b>1,254</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01**

Consent Decree Tank System Number: **2207**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	286	0
scfh vapor/tank <sup>i</sup>	227	0
Mscfd	5	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	227	227
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,834</b>	<b>3,834</b>

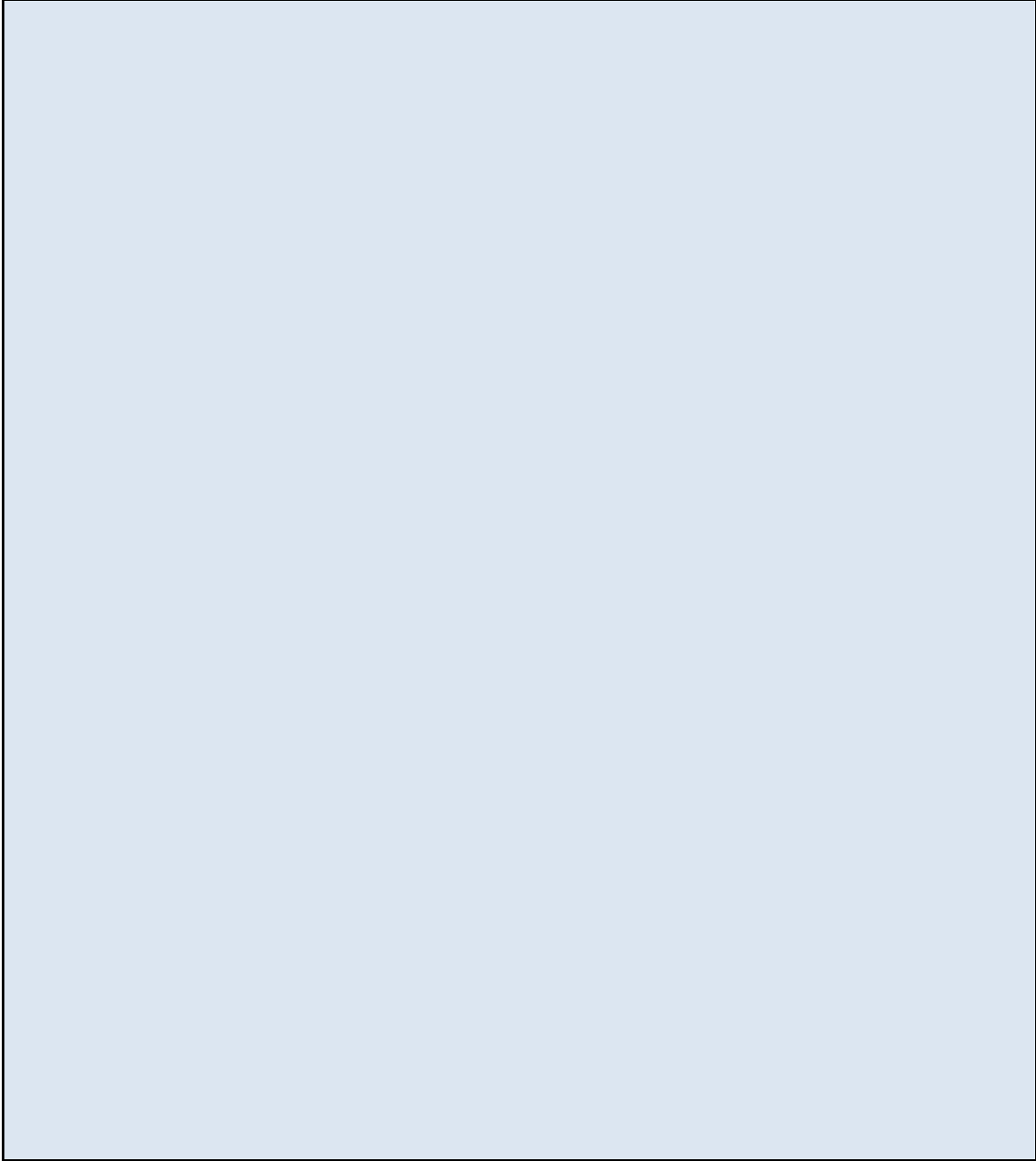


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON BOHLENDER OSTER T4N-R65W-S27 L01**

Consent Decree Tank System Number: **2207**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON BOHLENDER T4N-R65W-S27 L01**

Consent Decree Tank System Number: **2291**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER T4N-R65W-S27 L01_FINAL PACKET	.pdf	2/24/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER T4N-R65W-S27 L01_STEM Engineering Evaluation_rev1	.xlsm	7/7/2016	STEM Engineering Evaluation Spreadsheet
ANDERSON BOHLENDER T4N-R65W-S27 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER T4N-R65W-S27 L01_FINAL PACKET	.pdf	2/24/2016	Work Request
ANDERSON BOHLENDER T4N-R65W-S27 L01_FINAL PACKET	.pdf	2/24/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER T4N-R65W-S27 L01_WALKDOWN	.pdf	2/16/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER T4N-R65W-S27 L01_IR VERIFICATION	.pdf	2/16/2016	IR Verification Field Data Sheet
ANDERSON BOHLENDER T4N-R65W-S27 L01_0693_NORMAL	.mp4	2/16/2016	IR Camera Video Normal Operations
ANDERSON BOHLENDER T4N-R65W-S27 L01_0694_DUMP	.mp4	2/16/2016	IR Camera Video During Dump Event
ANDERSON BOHLENDER T4N-R65W-S27 L01_0695_POST	.mp4	2/16/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON BOHLENDER T4N-R65W-S27 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSON BOHLENDER T4N-R65W-S27 L01**

**Consent Decree Tank System Number:** **2291**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>315</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>4,018</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,219</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,219</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>374</b>	<b>582</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/15/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON BOHLENDER T4N-R65W-S27 L01**

Consent Decree Tank System Number: **2291**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	794							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	82.9							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	315	0
scfh vapor/tank <sup>i</sup>	250	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,454	3,307
Oil Tank Working Rate	314	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	250	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,018</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON BOHLENDER T4N-R65W-S27 L01**

Consent Decree Tank System Number: **2291**

**Audit Notes**

**Modeling Guideline and Engineering Guideline not strictly applied**

Field datasheet (Final Packet, pg 10) shows a 315 bbl oil tank onsite. This oil tank was not removed or modified and therefore still exists onsite. A 300 bbl oil tank was used in the Engineering Evaluation (Signed Eval, pg 2). Using a smaller 300 bbl vs 315 bbl oil tank results in the potential for the PPIVFR to be underestimated and therefore the Modeling Guideline was not strictly followed.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied. Assuming zero headspace surge capacity does not show an exceedance of the vapor control system capacity.

**Oil dump valve size unknown**

The STEM Work Request (Final Packet, pg 3) requests to change the 2" oil dump valve to a 1" valve with 1/2" trim. Item A1 in the STEM Walkdown Checklist (Final Packet, pg 6) is checked "yes", indicating the oil dump valve trim is a 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly followed. Assuming a 2" valve size on the separator, this scenario does not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01**

Consent Decree Tank System Number: **2330**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_FINAL PACKET	.pdf	8/22/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	8/25/2016	STEM Engineering Evaluation Spreadsheet
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_SIGNED EVAL	.pdf	8/25/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_FINAL PACKET	.pdf	8/22/2016	Work Request
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_FINAL PACKET	.pdf	8/22/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_FINAL PACKET	.pdf	8/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_FINAL PACKET	.pdf	8/22/2016	IR Verification Field Data Sheet
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_1411_NORMAL	.mp4	8/17/2016	IR Camera Video Normal Operations
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_1412_DUMP	.mp4	8/17/2016	IR Camera Video During Dump Event
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_1413_POST	.mp4	8/17/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01_SIGNED EVAL	.pdf	8/25/2016	VCS Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01**

**Consent Decree Tank System Number:** **2330**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,926</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,906</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>22,329</b>	<b>22,329</b>	
Total VCS Capacity (scfh)	<b>27,235</b>	<b>28,871</b>	
VCS Capacity minus PPIVF (scfh)	<b>22,489</b>	<b>23,944</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Driscoll  
 Audit Document Review Date: 11/8/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/11/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01**

Consent Decree Tank System Number: **2330**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,746</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01**

**Consent Decree Tank System Number:** **2330**

**Audit Notes**

Per the Work Request (ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01\_FINAL PACKET.pdf, pg. 3) a new LP Separator to be installed on site. The Job Sheet (ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01\_FINAL PACKET.pdf, pg 35) confirms LP separator installed but does not indicate the oil dump valve size or trim. Item A1 The Final Walkdown (ANDERSON MARLEY ROBT UPRR PANAM T4N-R65W-S33 L01\_WALKDOWN.pdf, pg 1) indicates the trim is 1/2" consistent with the signed evaluation. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON T4N-R64W-S30 L02**

Consent Decree Tank System Number: **713**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ANDERSON T4N-R64W-S30 L02_FINAL PACKET	.pdf	8/21/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON T4N-R64W-S30 L02_STEM Engineering Evaluation_rev1	.xlsm	6/5/2017	STEM Engineering Evaluation Spreadsheet
ANDERSON T4N-R64W-S30 L02_Final Signed STEM Plan	.pdf	7/30/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON T4N-R64W-S30 L02_FINAL PACKET	.pdf	8/21/2017	Work Request
ANDERSON T4N-R64W-S30 L02_FINAL PACKET	.pdf	8/21/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON T4N-R64W-S30 L02_WALKDOWN	.pdf	10/30/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON T4N-R64W-S30 L02_IR VERIFICATION	.pdf	5/8/2017	IR Verification Field Data Sheet
ANDERSON T4N-R64W-S30 L02_2013_NORMAL	.mp4	5/4/2017	IR Camera Video Normal Operations
ANDERSON T4N-R64W-S30 L02_2014_DUMP	.mp4	5/4/2017	IR Camera Video During Dump Event
ANDERSON T4N-R64W-S30 L02_2015_POST	.mp4	5/4/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ANDERSON T4N-R64W-S30 L02_SIGNED EVAL	.pdf	6/9/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSON T4N-R64W-S30 L02**

**Consent Decree Tank System Number:** **713**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,204</b>	<b>2,325</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>2,812</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>4</b>	<b>4</b>	
Total VCS Capacity (scfh)	<b>2,816</b>	<b>5,837</b>	
VCS Capacity minus PPIVF (scfh)	<b>612</b>	<b>3,512</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/27/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON T4N-R64W-S30 L02**

Consent Decree Tank System Number: **713**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>440</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>45.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,913</b>	<b>1,802</b>
Oil Tank Working Rate	<b>174</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,325</b>	<b>2,204</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON T4N-R64W-S30 L02**

Consent Decree Tank System Number: **713**

**Audit Notes**

The Work Request indicated the oil dump valve on the LP separator were to be modified to Kimray 1400 with 3/8" trims. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 3/8" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON T6N-R65W-S2 L01**

Consent Decree Tank System Number: **1516**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ANDERSON T6N-R65W-S2 L01_FINAL PACKET	.pdf	12/22/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON T6N-R65W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
ANDERSON T6N-R65W-S2 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON T6N-R65W-S2 L01_FINAL PACKET	.pdf	12/22/2015	Work Request
ANDERSON T6N-R65W-S2 L01_FINAL PACKET	.pdf	12/22/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON T6N-R65W-S2 L01_WALKDOWN	.pdf	12/17/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON T6N-R65W-S2 L01_IR VERIFICATION	.pdf	12/17/2015	IR Verification Field Data Sheet
ANDERSON T6N-R65W-S2 L01_0530_NORMAL	.mp4	12/17/2015	IR Camera Video Normal Operations
ANDERSON T6N-R65W-S2 L01_0531_DUMP	.mp4	12/17/2015	IR Camera Video During Dump Event
ANDERSON T6N-R65W-S2 L01_0532_POST	.mp4	12/17/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ANDERSON T6N-R65W-S2 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ANDERSON T6N-R65W-S2 L01**

**Consent Decree Tank System Number:** **1516**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,796</b>	<b>7,797</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,117</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>4,408</b>	<b>4,408</b>	
Total VCS Capacity (scfh)	<b>11,525</b>	<b>13,608</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,729</b>	<b>5,811</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/15/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON T6N-R65W-S2 L01**

Consent Decree Tank System Number: **1516**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.80</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>162.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,753</b>	<b>6,753</b>
Oil Tank Working Rate	<b>569</b>	<b>568</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>7,797</b>	<b>7,796</b>

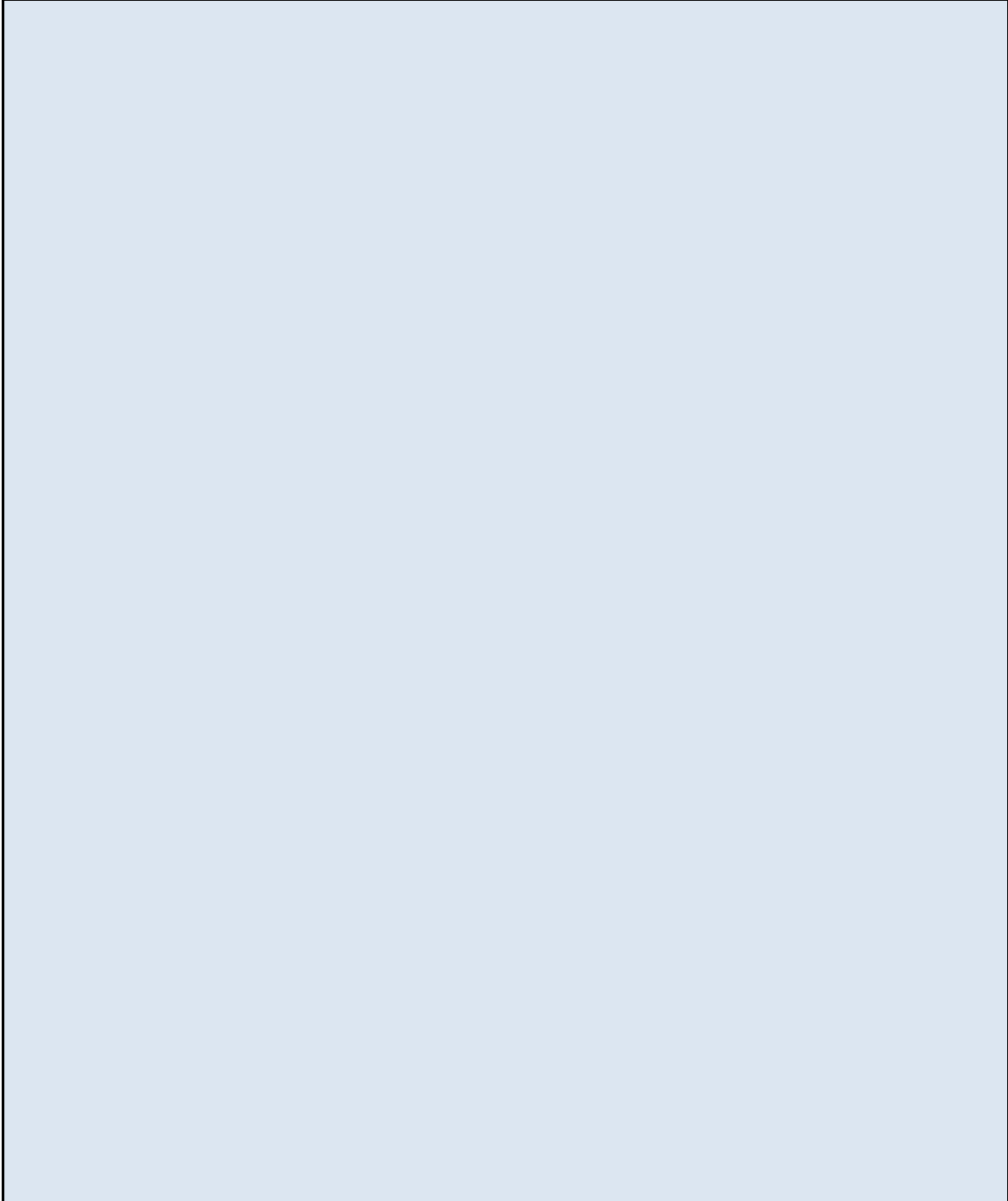


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANDERSON T6N-R65W-S2 L01**

Consent Decree Tank System Number: **1516**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANNIE SITZMAN T5N-R64W-S3 L01**

Consent Decree Tank System Number: **293**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ANNIE SITZMAN T5N-R64W-S3 L01_FINAL PACKET	.pdf	4/15/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ANNIE SITZMAN T5N-R64W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	1/3/2018	STEM Engineering Evaluation Spreadsheet
ANNIE SITZMAN T5N-R64W-S3 L01_SIGNED EVAL	.pdf	1/3/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ANNIE SITZMAN T5N-R64W-S3 L01_FINAL PACKET	.pdf	4/15/2016	Work Request
ANNIE SITZMAN T5N-R64W-S3 L01_FINAL PACKET	.pdf	4/15/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ANNIE SITZMAN T5N-R64W-S3 L01_WALKDOWN	.pdf	4/14/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ANNIE SITZMAN T5N-R64W-S3 L01_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
ANNIE SITZMAN T5N-R64W-S3 L01_0866_NORMAL	.mp4	4/14/2016	IR Camera Video Normal Operations
ANNIE SITZMAN T5N-R64W-S3 L01_0867_DUMP	.mp4	4/14/2016	IR Camera Video During Dump Event
ANNIE SITZMAN T5N-R64W-S3 L01_0868_POST	.mp4	4/14/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ANNIE SITZMAN T5N-R64W-S3 L01_SIGNED EVAL	.pdf	1/3/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANNIE SITZMAN T5N-R64W-S3 L01**

Consent Decree Tank System Number: **293**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,748</b>	<b>12,751</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>45,678</b>	<b>45,678</b>	
Total VCS Capacity (scfh)	<b>48,404</b>	<b>51,511</b>	
VCS Capacity minus PPIVF (scfh)	<b>35,656</b>	<b>38,761</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/15/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANNIE SITZMAN T5N-R64W-S3 L01**

Consent Decree Tank System Number: **293**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	
<b>Total</b>	<b>12,751</b>	<b>12,748</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ANNIE SITZMAN T5N-R64W-S3 L01**

Consent Decree Tank System Number: **293**

**Audit Notes**

No comments, documentation is consistent with Modeling Guideline, Engineering Design Standard and itself.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARD COBB T4N-R64W-S6 L01**

Consent Decree Tank System Number: **613**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ARD COBB T4N-R64W-S6 L01_FINAL PACKET	.pdf	5/20/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ARD COBB T4N-R64W-S6 L01_STEM Engineering Evaluation_rev1	.xlsm	10/19/2017	STEM Engineering Evaluation Spreadsheet
ARD COBB T4N-R64W-S6 L01_SIGNED EVAL	.pdf	11/2/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ARD COBB T4N-R64W-S6 L01_FINAL PACKET	.pdf	5/20/2016	Work Request
ARD COBB T4N-R64W-S6 L01_FINAL PACKET	.pdf	5/20/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ARD COBB T4N-R64W-S6 L01_FINAL PACKET	.pdf	5/20/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ARD COBB T4N-R64W-S6 L01_IR VERIFICATION	.pdf	5/20/2016	IR Verification Field Data Sheet
ARD COBB T4N-R64W-S6 L01_1065_NORMAL	.mp4	5/19/2016	IR Camera Video Normal Operations
ARD COBB T4N-R64W-S6 L01_1066_DUMP	.mp4	5/19/2016	IR Camera Video During Dump Event
ARD COBB T4N-R64W-S6 L01_1067_POST	.mp4	5/19/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ARD COBB T4N-R64W-S6 L01_SIGNED EVAL	.pdf	11/2/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ARD COBB T4N-R64W-S6 L01**

**Consent Decree Tank System Number:** **613**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,787</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>2,870</b>	<b>2,870</b>	
Total VCS Capacity (scfh)	<b>6,657</b>	<b>7,423</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,149</b>	<b>2,914</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARD COBB T4N-R64W-S6 L01**

Consent Decree Tank System Number: **613**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

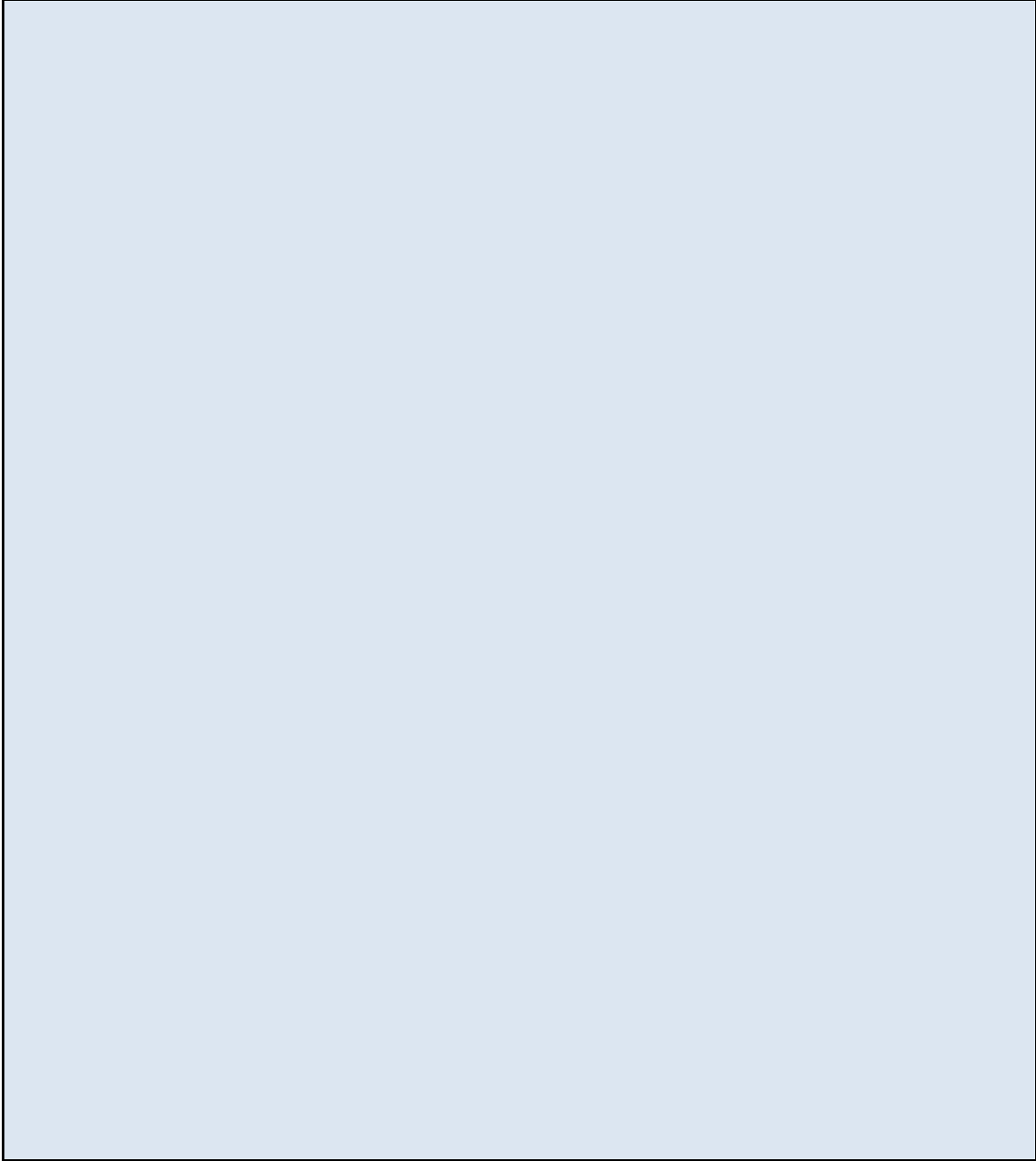


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARD COBB T4N-R64W-S6 L01**

Consent Decree Tank System Number: **613**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARENS GRANT T4N-R65W-S22 L02**

Consent Decree Tank System Number: **149**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ARENS GRANT T4N-R65W-S22 L02_FINAL PACKET	.pdf	2/1/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ARENS GRANT T4N-R65W-S22 L02_STEM Engineering Evaluation_rev1	.xlsm	9/1/2016	STEM Engineering Evaluation Spreadsheet
ARENS GRANT T4N-R65W-S22 L02_SIGNED EVAL	.pdf	9/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ARENS GRANT T4N-R65W-S22 L02_FINAL PACKET	.pdf	2/1/2018	Work Request
ARENS GRANT T4N-R65W-S22 L02_FINAL PACKET	.pdf	2/1/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ARENS GRANT T4N-R65W-S22 L02_FINAL PACKET	.pdf	2/1/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ARENS GRANT T4N-R65W-S22 L02_FINAL PACKET	.pdf	2/1/2018	IR Verification Field Data Sheet
ARENS GRANT T4N-R65W-S22 L02_1431_NORMAL	.mp4	8/25/2016	IR Camera Video Normal Operations
ARENS GRANT T4N-R65W-S22 L02_1432_DUMP	.mp4	8/25/2016	IR Camera Video During Dump Event
ARENS GRANT T4N-R65W-S22 L02_1433_POST	.mp4	8/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ARENS GRANT T4N-R65W-S22 L02_SIGNED EVAL	.pdf	9/6/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ARENS GRANT T4N-R65W-S22 L02

**Consent Decree Tank System Number:** 149

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,508	4,509	0%
Calculated Burner Capacity (scfh)	2,725	4,958	
Headspace Surge Capacity (scfh)	21,455	21,455	
Total VCS Capacity (scfh)	24,180	26,413	
VCS Capacity minus PPIVF (scfh)	19,672	21,904	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 2/20/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/13/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARENS GRANT T4N-R65W-S22 L02**

Consent Decree Tank System Number: **149**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARENS GRANT T4N-R65W-S22 L02**

Consent Decree Tank System Number: **149**

**Audit Notes**

-The final walkdown is not marked as being complete.

-A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did confirm the tank was "bottomed out" but the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks. In a request for additional information Noble responded that "Field verification for this facility was completed on or around 8/4/16, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARENS SHELTON T4N-R65W-S23 L01**

Consent Decree Tank System Number: **153**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ARENS SHELTON T4N-R65W-S23 L01_FINAL PACKET	.pdf	8/25/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ARENS SHELTON T4N-R65W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	9/8/2016	STEM Engineering Evaluation Spreadsheet
ARENS SHELTON T4N-R65W-S23 L01_SIGNED EVAL	.pdf	9/12/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ARENS SHELTON T4N-R65W-S23 L01_FINAL PACKET	.pdf	8/25/2016	Work Request
ARENS SHELTON T4N-R65W-S23 L01_FINAL PACKET	.pdf	8/25/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ARENS SHELTON T4N-R65W-S23 L01_WALKDOWN	.pdf	8/25/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ARENS SHELTON T4N-R65W-S23 L01_IR VERIFICATION	.pdf	8/17/2017	IR Verification Field Data Sheet
ARENS SHELTON T4N-R65W-S23 L01_1399_NORMAL	.mp4	8/16/2016	IR Camera Video Normal Operations
ARENS SHELTON T4N-R65W-S23 L01_1400_DUMP	.mp4	8/16/2016	IR Camera Video During Dump Event
ARENS SHELTON T4N-R65W-S23 L01_1401_POST	.mp4	8/16/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ARENS SHELTON T4N-R65W-S23 L01_SIGNED EVAL	.pdf	9/12/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ARENS SHELTON T4N-R65W-S23 L01

**Consent Decree Tank System Number:** 153

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,926</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>18,238</b>	<b>18,238</b>	
Total VCS Capacity (scfh)	<b>22,293</b>	<b>22,838</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,547</b>	<b>17,912</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARENS SHELTON T4N-R65W-S23 L01**

Consent Decree Tank System Number: **153**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C)	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,746</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARENS SHELTON T4N-R65W-S23 L01**

Consent Decree Tank System Number: **153**

**Audit Notes**

NEI response to data request regarding headspace tank. Response received 5/16/2018:  
Field verification for this facility was completed on or around 7/12/16, field verification confirmed that one tank was disconnected from the fill header in order to be used as headspace.

The Work Request indicated all dump valves were to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve modification on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARIEL UPRC T5N-R66W-S7 L01**

Consent Decree Tank System Number: **22**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ARIEL UPRC T5N-R66W-S7 L01_FINAL PACKET	.pdf	11/10/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ARIEL UPRC T5N-R66W-S7 L01_STEM Engineering Evaluation_rev1	.xlsm	7/7/2016	STEM Engineering Evaluation Spreadsheet
ARIEL UPRC T5N-R66W-S7 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ARIEL UPRC T5N-R66W-S7 L01_FINAL PACKET	.pdf	11/10/2017	Work Request
ARIEL UPRC T5N-R66W-S7 L01_FINAL PACKET	.pdf	11/10/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ARIEL UPRC T5N-R66W-S7 L01_WALKDOWN	.pdf	1/19/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ARIEL UPRC T5N-R66W-S7 L01_IR VERIFICATION	.pdf	1/19/2016	IR Verification Field Data Sheet
ARIEL UPRC T5N-R66W-S7 L01_0599_NORMAL	.mp4	1/18/2016	IR Camera Video Normal Operations
ARIEL UPRC T5N-R66W-S7 L01_0600_DUMP	.mp4	1/18/2016	IR Camera Video During Dump Event
ARIEL UPRC T5N-R66W-S7 L01_0601_POST	.mp4	1/18/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ARIEL UPRC T5N-R66W-S7 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARIEL UPRC T5N-R66W-S7 L01**

Consent Decree Tank System Number: **22**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,824</b>	<b>3,683</b>	<b>-4%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,368</b>	<b>2,368</b>	
Total VCS Capacity (scfh)	<b>5,920</b>	<b>6,968</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,096</b>	<b>3,285</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 12/13/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 1/4/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARIEL UPRC T5N-R66W-S7 L01**

Consent Decree Tank System Number: **22**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>3,049</b>
Oil Tank Working Rate	<b>288</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,824</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARIEL UPRC T5N-R66W-S7 L01**

Consent Decree Tank System Number: **22**

### Audit Notes

The NEI Signed Engineering Evaluation Summary was completed with a 2" oil dump valve with a 1/2" trim. The Job Sheet in the provided Final Packet indicates the oil dump valve was changed to a 1" valve with a 1/2" trim. NEI is overestimating the dump volumes which is a conservative approach.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARISTOCRAT T3N-R65W-S2 L01**

Consent Decree Tank System Number: **436**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ARISTOCRAT T3N-R65W-S2 L01_FINAL PACKET	.pdf	6/1/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ARISTOCRAT T3N-R65W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	9/1/2017	STEM Engineering Evaluation Spreadsheet
ARISTOCRAT T3N-R65W-S2 L01_SIGNED EVAL REVISED	.pdf	11/8/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ARISTOCRAT T3N-R65W-S2 L01_FINAL PACKET	.pdf	6/1/2016	Work Request
ARISTOCRAT T3N-R65W-S2 L01_FINAL PACKET	.pdf	6/1/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ARISTOCRAT T3N-R65W-S2 L01_FINAL PACKET	.pdf	6/1/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ARISTOCRAT T3N-R65W-S2 L01_IR VERIFICATION	.pdf	5/31/2016	IR Verification Field Data Sheet
ARISTOCRAT T3N-R65W-S2 L01_0998_NORMAL	.mp4	5/31/2016	IR Camera Video Normal Operations
ARISTOCRAT T3N-R65W-S2 L01_0999_DUMP	.mp4	5/31/2016	IR Camera Video During Dump Event
ARISTOCRAT T3N-R65W-S2 L01_1000_POST	.mp4	5/31/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ARISTOCRAT T3N-R65W-S2 L01_SIGNED EVAL REVISED	.pdf	11/8/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARISTOCRAT T3N-R65W-S2 L01**

Consent Decree Tank System Number: **436**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>500</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>22,578</b>	<b>23,104</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>2,904</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>80,757</b>	<b>80,757</b>	
Total VCS Capacity (scfh)	<b>83,661</b>	<b>86,590</b>	
VCS Capacity minus PPIVF (scfh)	<b>61,083</b>	<b>63,486</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 2/20/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 5/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARISTOCRAT T3N-R65W-S2 L01**

Consent Decree Tank System Number: **436**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	12689	5068						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	51	20						
Working Flow (Mscfd) <sup>l</sup>	71	28						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	23	6

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	2,959	2,741
Water Tank Working Rate	4,154	3,848
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	2,527	2,527
Total	23,104	22,578

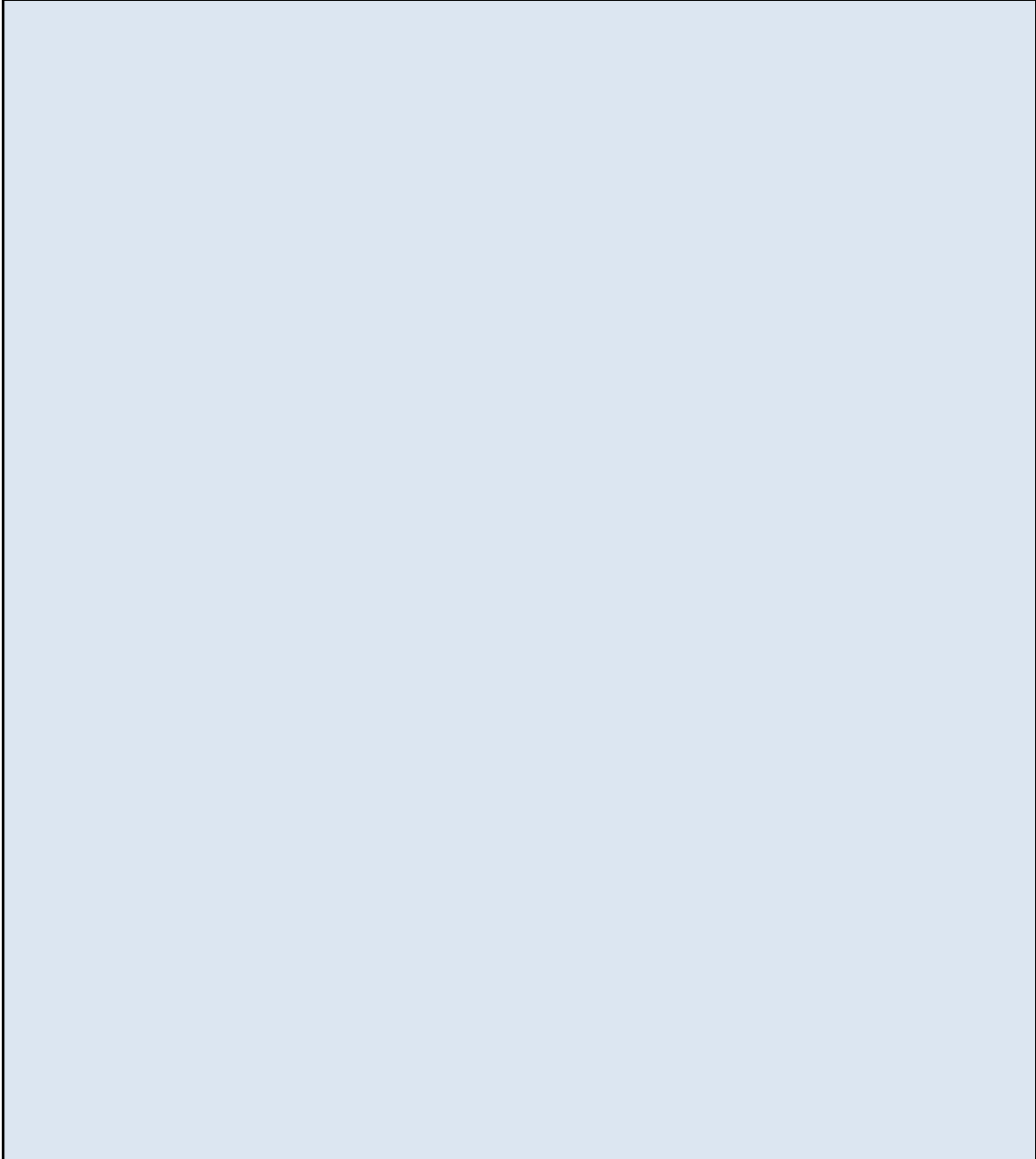


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ARISTOCRAT T3N-R65W-S2 L01**

Consent Decree Tank System Number: **436**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ATREYU FANNY T5N-R65W-S34 L01**

Consent Decree Tank System Number: **2147/227**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_FINAL PACKET	.pdf	11/8/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	11/8/2016	STEM Engineering Evaluation Spreadsheet
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_SIGNED EVAL	.pdf	11/8/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_FINAL PACKET	.pdf	11/8/2016	Work Request
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_FINAL PACKET	.pdf	11/8/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_WALKDOWN	.pdf	10/31/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_IR VERIFICATION	.pdf	10/31/2016	IR Verification Field Data Sheet
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_1023_NORMAL	.mp4	10/31/2016	IR Camera Video Normal Operations
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_1024_DUMP	.mp4	10/31/2016	IR Camera Video During Dump Event
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_1025_POST	.mp4	10/31/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
REED ATREYU FANNY T5N-R65W-S34 L01 & ATREYU FANNY T5N-R65W-S34 L01_SIGNED EVAL	.pdf	11/8/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ATREYU FANNY T5N-R65W-S34 L01**

**Consent Decree Tank System Number:** **2147/227**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,364</b>	<b>7,365</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,022</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>17,957</b>	<b>17,957</b>	
Total VCS Capacity (scfh)	<b>21,979</b>	<b>22,557</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,615</b>	<b>15,192</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/6/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ATREYU FANNY T5N-R65W-S34 L01**

Consent Decree Tank System Number: **2147/227**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.72	0.72						
Gas/Oil Ratio (scf/bbl)	96.4	96.4						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	530	530						
Vapor Pressure (psia) <sup>c</sup>	73	73						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	727	727						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1	70.1						
Working Flow (Mscfd) <sup>h,i</sup>	7	7						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	23	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	5,838	5,838
Oil Tank Working Rate	576	575
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>7,365</b>	<b>7,364</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ATREYU FANNY T5N-R65W-S34 L01**

Consent Decree Tank System Number: **2147/227**

**Audit Notes**

All provided documentation is consistent with Modeling Guideline, Engineering Design Standard and itself.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AVA ST T4N-R64W-S36 L02**

Consent Decree Tank System Number: **968**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L02_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
AVA ST T4N-R64W-S36 L02_SIGNED EVAL	.pdf	10/3/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L02_FINAL PACKET	.pdf	7/11/2018	Work Request
AVA ST T4N-R64W-S36 L02_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L02_WALKDOWN	.pdf	9/12/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L02_IR VERIFICATION	.pdf	9/12/2017	IR Verification Field Data Sheet
AVA ST T4N-R64W-S36 L02_4743_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
AVA ST T4N-R64W-S36 L02_4744_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
AVA ST T4N-R64W-S36 L02_4745_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L02_SIGNED EVAL	.pdf	10/3/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AVA ST T4N-R64W-S36 L02**

Consent Decree Tank System Number: **968**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No

Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>4,509</b>	<b>31%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>349</b>	<b>2,172</b>	
Total VCS Capacity (scfh)	<b>4,569</b>	<b>6,772</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,125</b>	<b>2,263</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:

Tom Kussard

Audit Document Review Date:

7/19/2018 & 11/26/2018

Audit Document Review Verified by:

K. Malmquist

Audit Document Verification Date:

12/31/2018

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AVA ST T4N-R64W-S36 L02**

Consent Decree Tank System Number: **968**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>2,919</b>
Oil Tank Working Rate	<b>314</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>3,444</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AVA ST T4N-R64W-S36 L02**

Consent Decree Tank System Number: **968**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 8-13) are not dated. Date assumed to be same as Facility Scouting Date (2/29/2016).

2. A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separator to produce into all tanks. The Engineering Evaluation addressed a single tank (90% maximum fill) with overflow, which is conservative. The second tank would contribute to PPIVFR (breathing loss), but such contribution would be negligible. The Modeling Guideline and Engineering Evaluation were therefore correctly (conservatively) applied.

**3. Diameter of VOC line Tanks to KO Pot - Request additional information**

The STEM Work Request Form (Final Packet, pg 3) requests that the existing 2" VOC line be replaced with a 3" VOC line from the tanks to KO pot. The Engineering Evaluation shows a 3" VOC line from tanks to KO onsite.

No documentation is provided that indicates the 3" VOC line from tanks to KO was installed onsite. If a 2" VOC line does still exist onsite and not a 3", then the control system capacity is being overestimated and the Engineering Design Standard is not being followed.

**Request confirmation of 3-inch VOC line size from tank(s) to Knockout.**

**Update 11/26/2018 - Noble confirmed via data request a 3" VOC line from Tanks to KO does currently exist onsite.**

**4. Separator Operating Pressure - Modeling Guideline Not Followed**

The QC STEM Checkout form (Final Packet, pg 23) indicates the LP separator installed onsite is set to operate at 70 psi. The Engineering Evaluation indicates the separator is set to operate at 60 psi, no documentation is provided to indicate the separator is set to operate at 60 psi. With the actual onsite separator pressure higher than the pressure in the Engineering Evaluation, the PPIVFR is being underestimated.

The Engineering Evaluation is dated 10/3/2017, the QC STEM Checkout is dated 8/8/2017 and the Signed Walkdown is dated 9/12/2017. It appears the Engineering Evaluation may have been updated, however no supporting documentation was provided to indicate the changes in the updated Engineering Evaluation were completed. Therefore the modeling guideline is not being followed.

**5. Burner Make/Model.**

The STEM WORK REQUEST FORM and the JOB SHEET specified that the existing Tornado tank burner be removed and replaced with a new Leed EC48-25. The STEM DESIGN CONFIRMATION FORM and STEM ENGINEERING EVALUATION list a Tornado 48" tank burner. Whether or not the burner was replaced, the Tornado burner has the lowest capacity in comparison with the Leed EC48-25. Consequently, the design evaluation indicating adequate design is conservative.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AVA ST T4N-R64W-S36 L04**

Consent Decree Tank System Number: **497**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L04_FINAL PACKET	.pdf	9/12/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L04_STEM Engineering Evaluation_rev1	.xlsm	9/6/2017	STEM Engineering Evaluation Spreadsheet
AVA ST T4N-R64W-S36 L04_SIGNED EVAL	.pdf	9/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L04_FINAL PACKET	.pdf	9/12/2017	Work Request
AVA ST T4N-R64W-S36 L04_FINAL PACKET	.pdf	9/12/2017	Construction Jobsheets
2018 Draft Attachments to Comment Letter	.pdf	3/27/2020	Supplimental Completetion Documentation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L04_WALKDOWN	.pdf	9/12/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L04_IR VERIFICATION	.pdf	9/6/2017	IR Verification Field Data Sheet
AVA ST T4N-R64W-S36 L04_4715_NORMAL	.mp4	9/5/2017	IR Camera Video Normal Operations
AVA ST T4N-R64W-S36 L04_4716_DUMP	.mp4	9/5/2017	IR Camera Video During Dump Event
AVA ST T4N-R64W-S36 L04_4717_POST	.mp4	9/5/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
AVA ST T4N-R64W-S36 L04_SIGNED EVAL	.pdf	9/12/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** AVA ST T4N-R64W-S36 L04

**Consent Decree Tank System Number:** 497

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	60							
Dump Valve Size & Trim Size (in)	1" & 3/8"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	1,986	1,986	0%
Calculated Burner Capacity (scfh)	2,812	5,833	
Headspace Surge Capacity (scfh)	0	0	
Total VCS Capacity (scfh)	2,812	5,833	
VCS Capacity minus PPIVF (scfh)	826	3,848	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 6/11/2018  
 Audit Document Review Verified by: Angela M. Oberlander and James Van Horne  
 Audit Document Verification Date: 10/12/2018 and 7/6/2020



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **AVA ST T4N-R64W-S36 L04**

Consent Decree Tank System Number: **497**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>396</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>38.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,591</b>	<b>1,591</b>
Oil Tank Working Rate	<b>157</b>	<b>157</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>1,986</b>	<b>1,986</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: AVA ST T4N-R64W-S36 L04

Consent Decree Tank System Number: 497

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was accounted for in NEI's Engineering Evaluation, so the Engineering Design Standard has not been misapplied.

Email from automation group dated 8/22/2017 indicated the PSHH was set to 70 psig, which coincides with the work request dated 5/25/2017. The provided signed engineering evaluation, dated 9/6/2017, was completed with a LP separator pressure of 60 psig. Noble provided additional information in a letter dated 3/27/2020 demonstrating that the PSHH was set to 60 psig on 9/12/2017.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BACON BOULTER BRANTNER T5N-R65W-S34 L01**

**Consent Decree Tank System Number:** **230**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BACON BOULTER BRANTNER T5N-R65W-S34 L01_FINAL PACKET	.pdf	7/21/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BACON BOULTER BRANTNER T5N-R65W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	12/16/2016	STEM Engineering Evaluation Spreadsheet
BACON BOULTER BRANTNER T5N-R65W-S34 L01_SIGNED EVAL	.pdf	12/16/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BACON BOULTER BRANTNER T5N-R65W-S34 L01_FINAL PACKET	.pdf	8/17/2015	Work Request
BACON BOULTER BRANTNER T5N-R65W-S34 L01_FINAL PACKET	.pdf	8/17/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BACON BOULTER BRANTNER T5N-R65W-S34 L01_WALKDOWN	.pdf	12/9/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BACON BOULTER BRANTNER T5N-R65W-S34 L01_0485_NORMAL	.mp4	12/2/2015	IR Camera Video Normal Operations
BACON BOULTER BRANTNER T5N-R65W-S34 L01_0486_DUMP	.mp4	12/2/2015	IR Camera Video During Dump Event
BACON BOULTER BRANTNER T5N-R65W-S34 L01_0489_POST	.mp4	12/2/2015	IR Camera Video Post Dump Event
BACON BOULTER BRANTNER T5N-R65W-S34 L01_IR VERIFICATION	.pdf	12/2/2015	IR Verification Field Data Sheet

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BACON BOULTER BRANTNER T5N-R65W-S34 L01_SIGNED EVAL	.pdf	12/16/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BACON BOULTER BRANTNER T5N-R65W-S34 L01**  
**Consent Decree Tank System Number:** **230**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,811</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>705</b>	<b>705</b>	
Total VCS Capacity (scfh)	<b>4,516</b>	<b>5,258</b>	
VCS Capacity minus PPIVF (scfh)	<b>671</b>	<b>1,413</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 11/10/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BACON BOULTER BRANTNER T5N-R65W-S34 L01**

Consent Decree Tank System Number: **230**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,845</b>	<b>3,845</b>

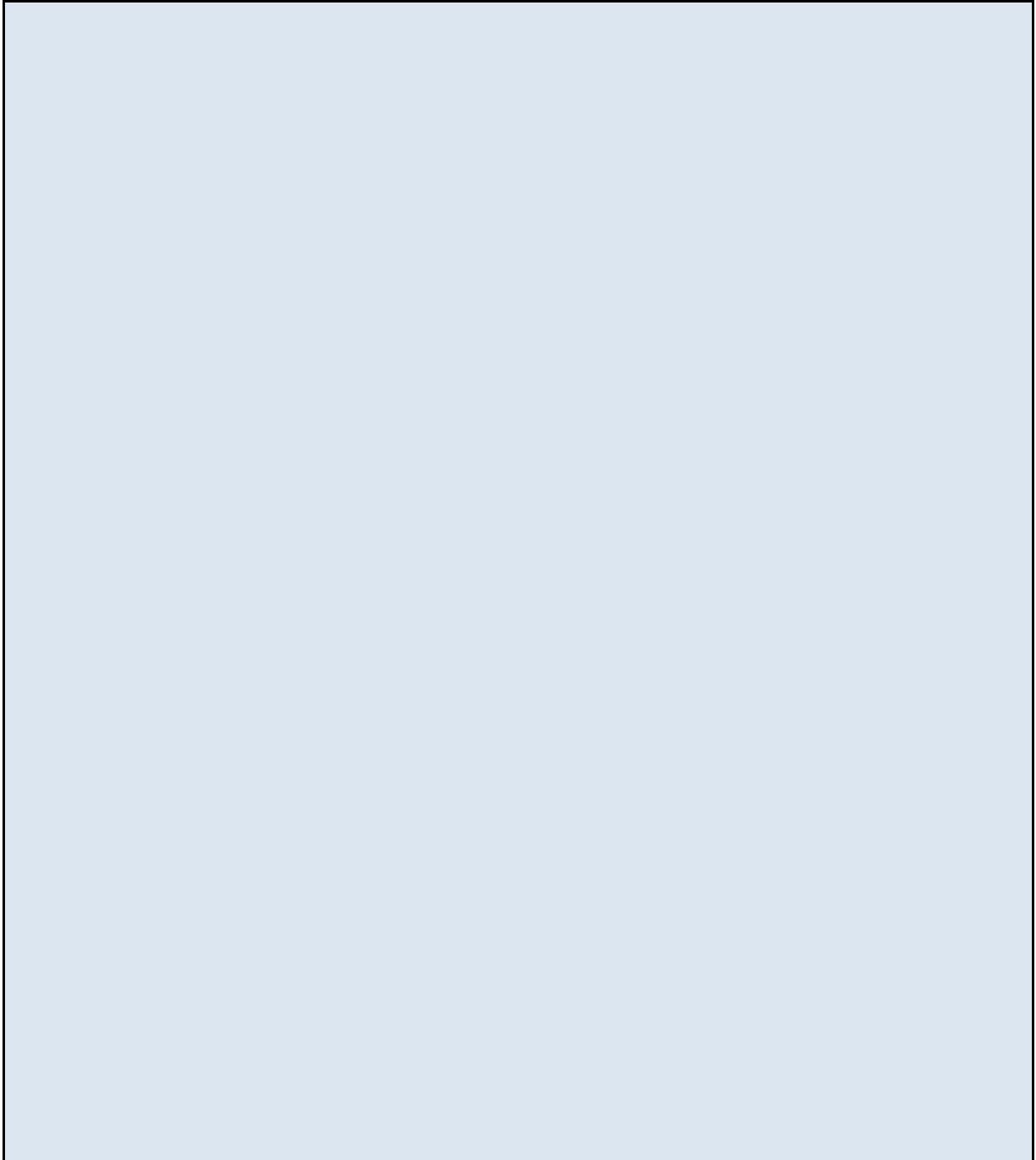


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BACON BOULTER BRANTNER T5N-R65W-S34 L01**

Consent Decree Tank System Number: **230**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BADGER FED T8N-R60W-S3 L01**

Consent Decree Tank System Number: **2068**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BADGER FED T8N-R60W-S3 L01_FINAL PACKET	.pdf	4/15/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BADGER FED T8N-R60W-S3 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/12/2017	STEM Engineering Evaluation Spreadsheet
BADGER FED T8N-R60W-S3 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BADGER FED T8N-R60W-S3 L01_FINAL PACKET	.pdf	4/15/2017	Work Request
BADGER FED T8N-R60W-S3 L01_FINAL PACKET	.pdf	4/15/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BADGER FED T8N-R60W-S3 L01_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BADGER FED T8N-R60W-S3 L01_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
BADGER FED T8N-R60W-S3 L01_0348_NORMAL	.mp4	4/14/2016	IR Camera Video Normal Operations
BADGER FED T8N-R60W-S3 L01_0349_DUMP	.mp4	4/14/2016	IR Camera Video During Dump Event
BADGER FED T8N-R60W-S3 L01_0353_POST	.mp4	4/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BADGER FED T8N-R60W-S3 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BADGER FED T8N-R60W-S3 L01**

Consent Decree Tank System Number: **2068**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>	<b>175</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>71,460</b>	<b>71,466</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,247</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>136,349</b>	<b>136,349</b>	
Total VCS Capacity (scfh)	<b>141,596</b>	<b>148,016</b>	
VCS Capacity minus PPIVF (scfh)	<b>70,136</b>	<b>76,550</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 12/29/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 2/27/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BADGER FED T8N-R60W-S3 L01**

Consent Decree Tank System Number: **2068**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.72							
Z2	-0.86							
Z3	0.98							
Z	1.83							
Gas/Oil Ratio (scf/bbl)	348.0							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	21.25							
Critical Pressure (psia) <sup>b</sup>	633							
Vapor Pressure (psia) <sup>c</sup>	188							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.81							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	4120							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	1433.8							
Working Flow (Mscfd) <sup>h,i</sup>	39							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77	0.77						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	21.25	21.25						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	7663	7663						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	31	31						
Working Flow (Mscfd) <sup>l</sup>	43	43						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	29	6

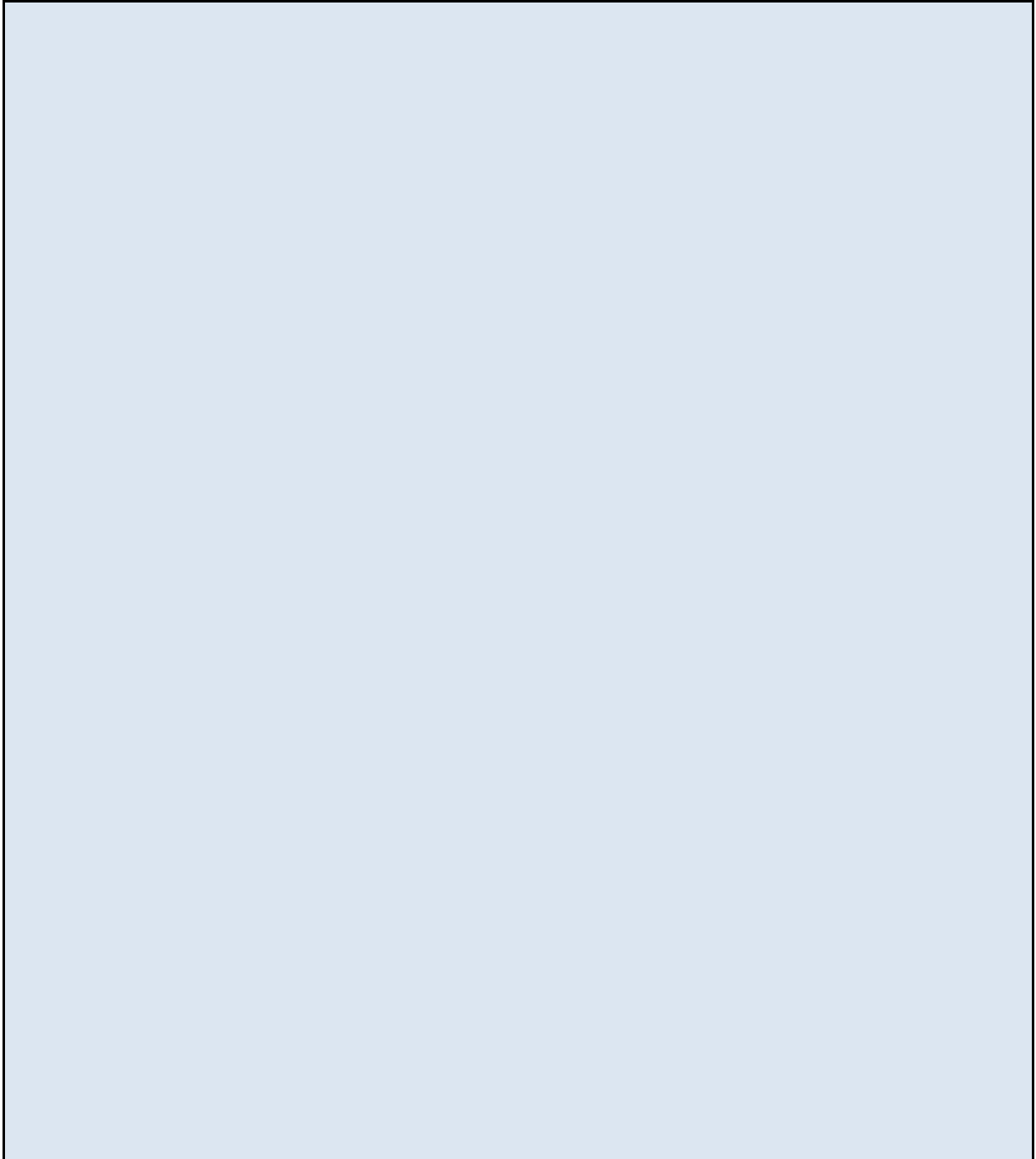
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	59,740	59,740
Oil Tank Working Rate	1,632	1,628
Water Tank Flash Rate	2,554	2,554
Water Tank Working Rate	3,586	3,585
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	2,527	2,527
Total	71,466	71,460

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BADGER FED T8N-R60W-S3 L01**

Consent Decree Tank System Number: **2068**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAKER CLYNCKE ST T5N-R64W-S36 L01**

Consent Decree Tank System Number: **442**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BAKER CLYNCKE ST T5N-R64W-S36 L01_FINAL PACKET	.pdf	6/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BAKER CLYNCKE ST T5N-R64W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	6/17/2016	STEM Engineering Evaluation Spreadsheet
BAKER CLYNCKE ST T5N-R64W-S36 L01_SIGNED EVAL	.pdf	6/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BAKER CLYNCKE ST T5N-R64W-S36 L01_FINAL PACKET	.pdf	6/16/2016	Construction Jobsheets
164_BAKER CLYNCKE ST T5N-R64W-S36 L01_Work Request	.pdf	11/14/2018	VOC diameter confirmations

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BAKER CLYNCKE ST T5N-R64W-S36 L01_WALKDOWN	.pdf	6/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BAKER CLYNCKE ST T5N-R64W-S36 L01_IR VERIFICATION	.pdf	6/15/2016	IR Verification Field Data Sheet
BAKER CLYNCKE ST T5N-R64W-S36 L01_1129_NORMAL	.mp4	6/13/2016	IR Camera Video Normal Operations
BAKER CLYNCKE ST T5N-R64W-S36 L01_1130_DUMP	.mp4	6/13/2016	IR Camera Video During Dump Event
BAKER CLYNCKE ST T5N-R64W-S36 L01_1131_POST	.mp4	6/13/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BAKER CLYNCKE ST T5N-R64W-S36 L01_SIGNED EVAL	.pdf	6/22/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BAKER CLYNCKE ST T5N-R64W-S36 L01**

**Consent Decree Tank System Number:** **442**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,555</b>	<b>2,555</b>	
Total VCS Capacity (scfh)	<b>6,107</b>	<b>7,155</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,599</b>	<b>2,646</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/15/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/13/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAKER CLYNCKE ST T5N-R64W-S36 L01**

Consent Decree Tank System Number: **442**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BAKER CLYNCKE ST T5N-R64W-S36 L01**

**Consent Decree Tank System Number:** **442**

**Audit Notes**

The walk down checklist (BAKER CLYNCKE ST T5N-R64W-S36 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (BAKER CLYNCKE ST T5N-R64W-S36 L01\_FINAL PACKET).

The QC stem checklist (BAKER CLYNCKE ST T5N-R64W-S36 L01\_FINAL PACKET, p 20) dated 5/11/2016 states the PSHH was set to 70 psig. However, the job sheet (BAKER CLYNCKE ST T5N-R64W-S36 L01\_FINAL PACKET, p 21) dated 5/3/2016-5/12/2016 describes setting the Versa Valve to 65 psig. The signed evaluation was completed with the PSHH at 70 psig. Because 70 psig is the most conservative value the modeling guideline is considered to be strictly followed.

The field data sheet (BAKER CLYNCKE ST T5N-R64W-S36 L01\_FINAL PACKET, p 13) lists the VOC line from the KO to the burner as 2". The job sheet (BAKER CLYNCKE ST T5N-R64W-S36 L01\_FINAL PACKET, p 21) confirms a 2" underground line was removed. There is no confirmation that the line from the KO to the burner was replaced. This contradicts the signed evaluation (BAKER CLYNCKE ST T5N-R64W-S36 L01\_SIGNED EVAL, p 2) which states the line is 4". In response to a data request Noble replied "Field verification for this facility was completed on or around 6/13/2016, field verification confirmed that the 4" AGL from the KO to the burner was installed" confirming the VOC line from the KO to the burner is 4".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALBOA C T4N-R64W-S20 L01**

Consent Decree Tank System Number: **671**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BALBOA C T4N-R64W-S20 L01_FINAL PACKET	.pdf	10/5/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BALBOA C T4N-R64W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	12/16/2016	STEM Engineering Evaluation Spreadsheet
BALBOA C T4N-R64W-S20 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BALBOA C T4N-R64W-S20 L01_FINAL PACKET	.pdf	10/5/2015	Work Request
BALBOA C T4N-R64W-S20 L01_FINAL PACKET	.pdf	10/5/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BALBOA C T4N-R64W-S20 L01_FINAL PACKET	.pdf	10/5/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BALBOA C T4N-R64W-S20 L01_IR VERIFICATION	.pdf	10/2/2015	IR Verification Field Data Sheet
BALBOA C T4N-R64W-S20 L01_0300_NORMAL	.mp4	10/1/2015	IR Camera Video Normal Operations
BALBOA C T4N-R64W-S20 L01_0301_DUMP	.mp4	10/1/2015	IR Camera Video During Dump Event
BALBOA C T4N-R64W-S20 L01_0302_POST	.mp4	10/1/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BALBOA C T4N-R64W-S20 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALBOA C T4N-R64W-S20 L01**

Consent Decree Tank System Number: **671**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,769</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>558</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,327</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>883</b>	<b>1,013</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 12/12/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 2/13/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALBOA C T4N-R64W-S20 L01**

Consent Decree Tank System Number: **671**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALBOA C T4N-R64W-S20 L01**

Consent Decree Tank System Number: **671**

**Audit Notes**

-The work request (Final Packet pg. 3) states that the valve and trim size on the remaining separator should be changed from a 2" to a 1" with a 1/2" trim. Item A1 of the Walkdown Checklist (Walkdown pg. 1) indicates that the trim was changed to 1/2". There is no verification that the valve size was reduced as requested. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

-The work request (Final Packet pg. 3) states that the Automated PSHH on the low pressure side of the HLP separator was to be set to 60 psig. There is no verification in the original documentation that this work was completed. In response to a request for additional data Noble replied "Field verification for this facility was completed on or around 8/19/2015, field verification confirmed that the HLP LP separator was set at 60 psig as requested." This confirms the work was completed.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALL RANCH T7N-R63W-S3 L01**

Consent Decree Tank System Number: **571**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
119_BALL RANCH T7N-R63W-S3 L01_FINAL PACKET_Rev	.pdf	11/14/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	7/25/2017	STEM Engineering Evaluation Spreadsheet
BALL RANCH T7N-R63W-S3 L01_SIGNED EVAL	.pdf	7/26/2017	Final Signed Engineering Evaluation
119_BALL RANCH T7N-R63W-S3 L01_STEM Engineering Evaluation_rev1_Rev	.xlsm	11/14/2018	Revised STEM Engineering Evaluation Spreadsheet
119_BALL RANCH T7N-R63W-S3 L01_SIGNED EVAL_Rev	.pdf	4/11/2018	Revised Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S3 L01_FINAL PACKET	.pdf	4/12/2017	Work Request
BALL RANCH T7N-R63W-S3 L01_FINAL PACKET	.pdf	5/16/2017	Construction Jobsheets
119_BALL RANCH T7N-R63W-S3 L01_FINAL PACKET_Rev	.pdf	11/14/2018	Revised Work Request

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S3 L01_WALKDOWN	.pdf	2/6/2018	Final Facility Walkdown Checklist
119_BALL RANCH T7N-R63W-S3 L01_FINAL PACKET_Rev	.pdf	11/14/2018	Revised Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S3 L01_IR VERIFICATION	.pdf	7/18/2017	IR Verification Field Data Sheet
BALL RANCH T7N-R63W-S3 L01_2137_NORMAL	.mp4	7/17/2017	IR Camera Video Normal Operations
BALL RANCH T7N-R63W-S3 L01_2138_DUMP	.mp4	7/17/2017	IR Camera Video During Dump Event
BALL RANCH T7N-R63W-S3 L01_2139_POST	.mp4	7/17/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S3 L01_SIGNED EVAL	.pdf	7/26/2017	Final Signed Engineering Evaluation
119_BALL RANCH T7N-R63W-S3 L01_SIGNED EVAL_Rev	.pdf	4/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BALL RANCH T7N-R63W-S3 L01**

**Consent Decree Tank System Number:** **571**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>10</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>230</b>	<b>230</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>109,272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>216,417</b>	<b>216,427</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,418</b>	<b>9,106</b>	
Headspace Surge Capacity (scfh)	<b>579,472</b>	<b>579,472</b>	
Total VCS Capacity (scfh)	<b>586,890</b>	<b>588,578</b>	
VCS Capacity minus PPIVF (scfh)	<b>370,473</b>	<b>372,151</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 11/30/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/13/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALL RANCH T7N-R63W-S3 L01**

Consent Decree Tank System Number: **571**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.97	1.97						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	2.08	2.08						
Gas/Oil Ratio (scf/bbl)	519.1	519.1						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	682	682						
Vapor Pressure (psia) <sup>c</sup>	243	243						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.79	0.79						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	4859	4859						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	2522.4	2522.4						
Working Flow (Mscfd) <sup>h,i</sup>	46	46						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	57	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	210,199	210,199
Oil Tank Working Rate	3,851	3,841
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	2,377	2,377
Truck Loading Vapor	0	0
<b>Total</b>	<b>216,427</b>	<b>216,417</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALL RANCH T7N-R63W-S3 L01**

Consent Decree Tank System Number: **571**

**Audit Notes**

The site sketch on Page 10 of the final packet appears to show the water tanks are connected to the same VCS system as the oil tanks. Rest of documentation seems to indicate that the water tanks have their own VCS piping and burner. Additional data was requested and Noble replied that "Field verification for this facility was completed on or around 7/17/2017, field verification confirmed that the two water tanks are not connected to the oil tank VCS System."

The Field Data Sheets state the gas outlet on the LP Separators is routed to oil dumps. Additional data was requested to confirm if this was changed. In response Noble state that "An engineering review of this facility was completed on or around 9/11/2018, this review confirmed that the LP gas outlet is routed to the dumps." Noble also submitted a new signed evaluation dated 4/12/2018, a new work request dated 3/14/2018 and a new walkdown checklist (undated). The new work request specifies that the pneumatic PSHH on the HP be set to 230 psig and that two additional tanks be converted to headspace tanks. All of the work was confirmed to be completed

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALL RANCH T7N-R63W-S15 L02**

Consent Decree Tank System Number: **1991**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S15 L02_FINAL PACKET	.pdf	4/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S15 L02_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation
BALL RANCH T7N-R63W-S15 L02_STEM Engineering Evaluation	.xlsm	4/29/2017	STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S15 L02_FINAL PACKET	.pdf	4/29/2016	Work Request
BALL RANCH T7N-R63W-S15 L02_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S15 L02_WALKDOWN	.pdf	4/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S15 L02_IR VERIFICATION	.pdf	4/29/2016	IR Verification Field Data Sheet
BALL RANCH T7N-R63W-S15 L02_0937_NORMAL	.mp4	4/28/2016	IR Camera Video Normal Operations
BALL RANCH T7N-R63W-S15 L02_0938_DUMP	.mp4	4/28/2016	IR Camera Video During Dump Event
BALL RANCH T7N-R63W-S15 L02_0939_POST	.mp4	4/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BALL RANCH T7N-R63W-S15 L02_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALL RANCH T7N-R63W-S15 L02**

Consent Decree Tank System Number: **1991**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>	<b>175</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>1" &amp; 1/2"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>69,488</b>	<b>67,432</b>	<b>3%</b>
Calculated Burner Capacity (scfh)	<b>6,046</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>191,525</b>	<b>191,525</b>	
Total VCS Capacity (scfh)	<b>197,571</b>	<b>201,911</b>	
VCS Capacity minus PPIVF (scfh)	<b>128,083</b>	<b>134,479</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/7/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALL RANCH T7N-R63W-S15 L02**

Consent Decree Tank System Number: **1991**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.72</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.83</b>							
Gas/Oil Ratio (scf/bbl)	<b>348.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>633</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>188</b>							
Critical pressure ratio (F <sub>p</sub> ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4120</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1433.8</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>39</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.94</b>						
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>	<b>5.72</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>p</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>7663</b>	<b>2518</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>31</b>	<b>10</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>43</b>	<b>14</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>500</b>
scfh vapor/tank <sup>l</sup>	<b>396</b>	<b>396</b>
Mscfd	<b>29</b>	<b>19</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>59,740</b>	<b>59,740</b>
Oil Tank Working Rate	<b>1,632</b>	<b>1,628</b>
Water Tank Flash Rate	<b>1,697</b>	<b>2,554</b>
Water Tank Working Rate	<b>2,382</b>	<b>3,585</b>
Tank Breathing Rate	<b>1,981</b>	<b>1,981</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

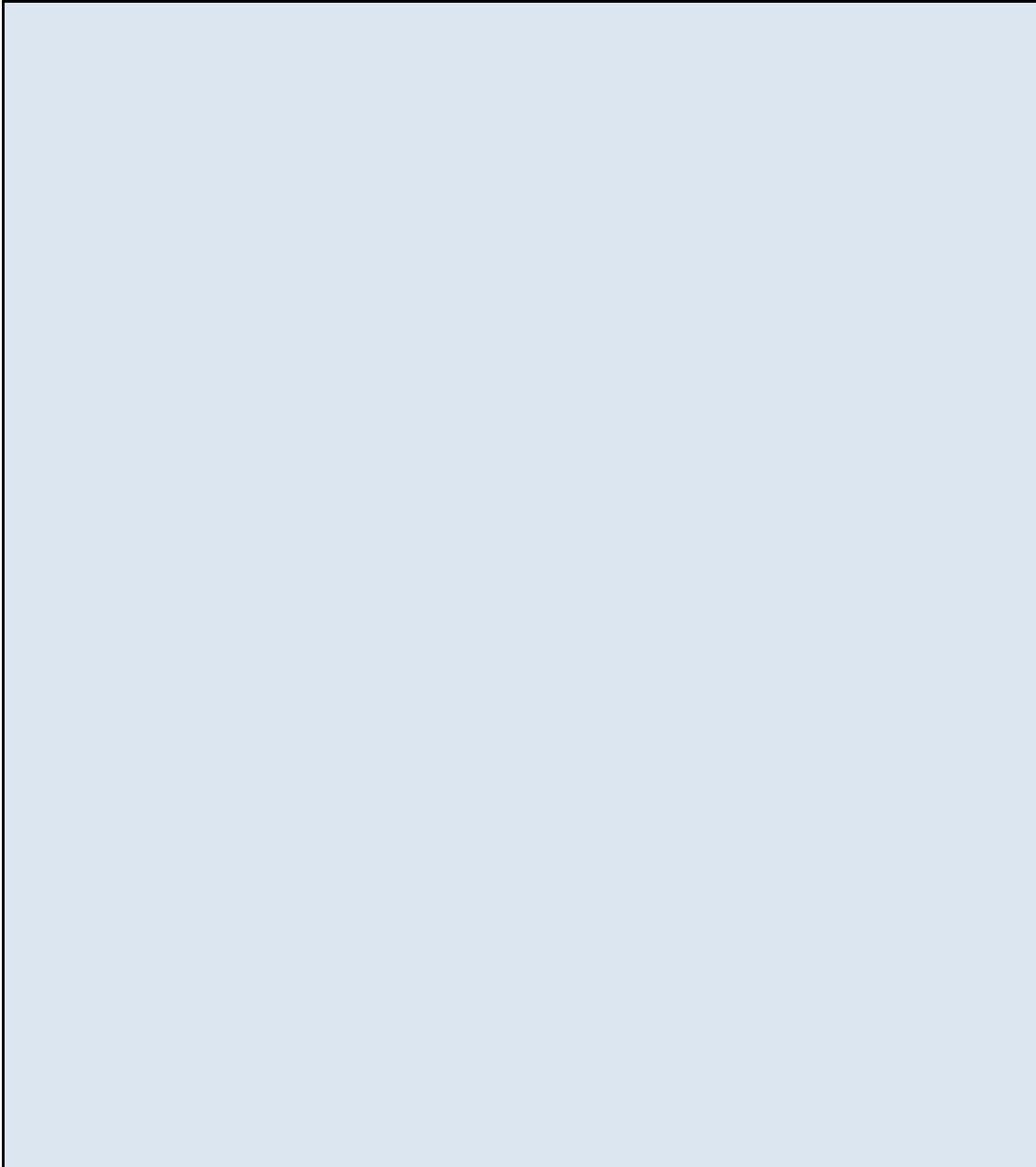
Truck Loading Vapor	0	0
Total	67,432	69,488

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BALL RANCH T7N-R63W-S15 L02**

Consent Decree Tank System Number: 1991

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BARNARD T4N-R65W-S4 L01**

Consent Decree Tank System Number: **1712**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BARNARD T4N-R65W-S4 L01_FINAL PACKET	.pdf	10/26/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BARNARD T4N-R65W-S4 L01_STEM Engineering Evaluation_rev1	.xlsm	12/21/2017	STEM Engineering Evaluation Spreadsheet
BARNARD T4N-R65W-S4 L01_SIGNED EVAL	.pdf	12/21/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BARNARD T4N-R65W-S4 L01_FINAL PACKET	.pdf	10/26/2015	Work Request
BARNARD T4N-R65W-S4 L01_FINAL PACKET	.pdf	10/26/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BARNARD T4N-R65W-S4 L01_WALKDOWN	.pdf	10/21/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BARNARD T4N-R65W-S4 L01_IR VERIFICATION	.pdf	10/21/2015	IR Verification Field Data Sheet
BARNARD T4N-R65W-S4 L01_0366_NORMAL	.mp4	10/21/2015	IR Camera Video Normal Operations
BARNARD T4N-R65W-S4 L01_0367_DUMP	.mp4	10/21/2015	IR Camera Video During Dump Event
BARNARD T4N-R65W-S4 L01_0368_POST	.mp4	10/21/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BARNARD T4N-R65W-S4 L01_SIGNED EVAL	.pdf	12/21/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BARNARD T4N-R65W-S4 L01**

Consent Decree Tank System Number: **1712**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,006</b>	<b>4,006</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,811</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,811</b>	<b>4,553</b>	
VCS Capacity minus PPIVF (scfh)	<b>-195</b>	<b>547</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/16/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BARNARD T4N-R65W-S4 L01**

Consent Decree Tank System Number: **1712**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	794							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	82.9							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,454	3,454
Oil Tank Working Rate	314	314
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,006</b>	<b>4,006</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BARNARD T4N-R65W-S4 L01**

Consent Decree Tank System Number: **1712**

**Audit Notes**

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis which resulted in the system not being adequately designed according to Noble calculations. The system is adequately designed according to SLR calculations. The Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T6N-R63W-S9 L01**

Consent Decree Tank System Number: **354**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L01_FINAL PACKET	.pdf	6/22/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
BASHOR T6N-R63W-S9 L01_SIGNED EVAL	.pdf	6/27/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L01_FINAL PACKET	.pdf	6/22/2016	Work Request
BASHOR T6N-R63W-S9 L01_FINAL PACKET	.pdf	6/22/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L01_WALKDOWN	.pdf	6/22/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L01_IR VERIFICATION	.pdf	6/21/2016	IR Verification Field Data Sheet
BASHOR T6N-R63W-S9 L01_1158_NORMAL	.mp4	6/20/2016	IR Camera Video Normal Operations
BASHOR T6N-R63W-S9 L01_1159_DUMP	.mp4	6/20/2016	IR Camera Video During Dump Event
BASHOR T6N-R63W-S9 L01_1160_POST	.mp4	6/20/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BASHOR T6N-R63W-S9 L01**

**Consent Decree Tank System Number:** **354**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,062</b>	<b>4,063</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,945</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>4,404</b>	<b>4,404</b>	
Total VCS Capacity (scfh)	<b>7,349</b>	<b>10,237</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,287</b>	<b>6,174</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:	Davis Neeper
Audit Document Review Date:	5/7/2018
Audit Document Review Verified by:	Angela M. Oberlander
Audit Document Verification Date:	8/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T6N-R63W-S9 L01**

Consent Decree Tank System Number: **354**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

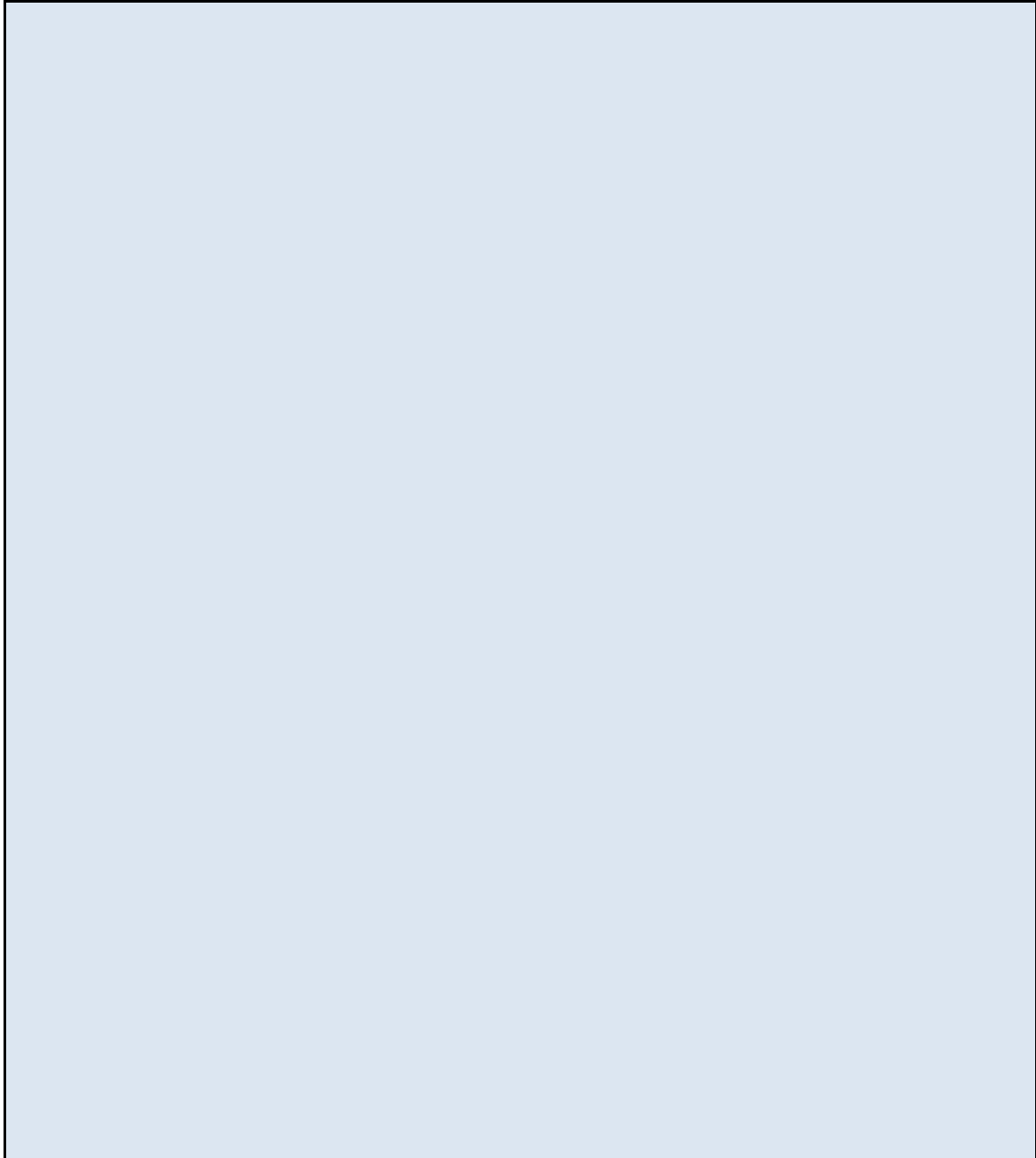
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	3,049
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,063</b>	<b>4,062</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T6N-R63W-S9 L01**

Consent Decree Tank System Number: **354**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T6N-R63W-S9 L02**

Consent Decree Tank System Number: **1636**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L02_FINAL PACKET	.pdf	4/30/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L02_STEM Engineering Evaluation_rev1	.xlsm	4/15/2016	STEM Engineering Evaluation Spreadsheet
BASHOR T6N-R63W-S9 L02_SIGNED EVAL	.pdf	4/20/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L02_FINAL PACKET	.pdf	4/30/2018	Work Request
BASHOR T6N-R63W-S9 L02_FINAL PACKET	.pdf	4/30/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L02_FINAL PACKET	.pdf	4/30/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L02_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
BASHOR T6N-R63W-S9 L02_0840_NORMAL	.mp4	4/7/2016	IR Camera Video Normal Operations
BASHOR T6N-R63W-S9 L02_0841_DUMP	.mp4	4/7/2016	IR Camera Video During Dump Event
BASHOR T6N-R63W-S9 L02_0842_POST	.mp4	4/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T6N-R63W-S9 L02_SIGNED EVAL	.pdf	4/20/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T6N-R63W-S9 L02**

Consent Decree Tank System Number: **1636**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>3,431</b>	<b>3,433</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,116</b>	<b>2,116</b>	
Total VCS Capacity (scfh)	<b>5,043</b>	<b>7,949</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,612</b>	<b>4,517</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T6N-R63W-S9 L02**

Consent Decree Tank System Number: **1636**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	725							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	64.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,670	2,670
Oil Tank Working Rate	287	286
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,433</b>	<b>3,431</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T6N-R63W-S9 L02**

Consent Decree Tank System Number: **1636**

**Audit Notes**

The stem work request form (PG 3 of FINAL PACKET pdf) states "ensure the oil dump trim size is 1/2" and to modify if necessary, however nowhere in the job sheets (PGs 20 through 23 of FINAL PACKET pdf) does it confirm this task was completed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T7N-R63W-S18 L01**

Consent Decree Tank System Number: **1990**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BASHOR T7N-R63W-S18 L01_FINAL PACKET	.pdf	7/18/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T7N-R63W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	7/22/2016	STEM Engineering Evaluation Spreadsheet
BASHOR T7N-R63W-S18 L01_SIGNED EVAL	.pdf	7/26/2016	Final Signed Engineering Evaluation
115_BASHOR T7N-R63W-S18 L01_STEM Engineering Evaluation_rev1_rework	.xlsm	11/14/2018	Revised STEM Engineering Evaluation Spreadsheet
115_BASHOR T7N-R63W-S18 L01_SIGNED EVAL_rev	.pdf	11/14/2018	Revised Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T7N-R63W-S18 L01_FINAL PACKET	.pdf	7/18/2016	Work Request
BASHOR T7N-R63W-S18 L01_FINAL PACKET	.pdf	7/18/2016	Construction Jobsheets
BASHOR T7N-R63W-S18 L01_COMPLETED REWORK PACKET	.pdf	11/14/2018	Rework Work Request

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T7N-R63W-S18 L01_WALKDOWN	.pdf	7/18/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T7N-R63W-S18 L01_IR VERIFICATION	.pdf	7/15/2016	IR Verification Field Data Sheet
BASHOR T7N-R63W-S18 L01_1275_NORMAL	.mp4	7/14/2016	IR Camera Video Normal Operations
BASHOR T7N-R63W-S18 L01_1276_DUMP	.mp4	7/14/2016	IR Camera Video During Dump Event
BASHOR T7N-R63W-S18 L01_1277_POST	.mp4	7/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BASHOR T7N-R63W-S18 L01_SIGNED EVAL	.pdf	7/26/2016	Final Signed Engineering Evaluation
115_BASHOR T7N-R63W-S18 L01_SIGNED EVAL_rev	.pdf	11/14/2018	Revised Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T7N-R63W-S18 L01**

Consent Decree Tank System Number: **1990**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>270</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>270</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>93,158</b>	<b>93,162</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,717</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>223,434</b>	<b>223,434</b>	
Total VCS Capacity (scfh)	<b>227,151</b>	<b>227,987</b>	
VCS Capacity minus PPIVF (scfh)	<b>133,993</b>	<b>134,825</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 12/13/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/13/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T7N-R63W-S18 L01**

Consent Decree Tank System Number: **1990**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	2.10							
Z2	-0.86							
Z3	0.98							
Z	2.22							
Gas/Oil Ratio (scf/bbl)	663.0							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.80							
Valve Coefficient (gpm/psi) (C)	12.20							
Critical Pressure (psia) <sup>b</sup>	717							
Vapor Pressure (psia) <sup>c</sup>	283							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.78							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	3194							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	2117.3							
Working Flow (Mscfd) <sup>h,i</sup>	30							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.80							
Valve Coefficient (gpm/psi) (C)	12.20							
Critical Pressure (psia) <sup>j</sup>	3200							
Vapor Pressure (psia) <sup>k</sup>	1							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.96							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bwpd) <sup>f,g</sup>	5615							

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	22							
Working Flow (Mscfd) <sup>l</sup>	32							

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	29	6

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	88,220	88,220
Oil Tank Working Rate	1,265	1,262
Water Tank Flash Rate	936	936
Water Tank Working Rate	1,314	1,314
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	0	0
Total	93,162	93,158

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BASHOR T7N-R63W-S18 L01**

Consent Decree Tank System Number: **1990**

**Audit Notes**

-The Walkdown Checklist was not marked complete.

-The STEM Work Request Form states the pneumatic PSHH for the HP HI/LO was to be set at no higher than 190 psig, however there is no confirmation that this work was completed. Noble provided a response to the above discrepancy on 11/14/2018 that states "Rework was completed on or around 8/15/2018, which increased the HP separator pressure to no higher than 270 psig." Documentation of completed rework was also submitted which provided verification that the rework was completed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAUER T5N-R64W-S9 L01**

Consent Decree Tank System Number: **1676**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BAUER T5N-R64W-S9 L01_FINAL PACKET	.pdf	1/27/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BAUER T5N-R64W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	1/30/2017	STEM Engineering Evaluation Spreadsheet
BAUER T5N-R64W-S9 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BAUER T5N-R64W-S9 L01_FINAL PACKET	.pdf	1/27/2017	Work Request
BAUER T5N-R64W-S9 L01_FINAL PACKET	.pdf	1/27/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BAUER T5N-R64W-S9 L01_WALKDOWN	.pdf	1/24/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BAUER T5N-R64W-S9 L01_IR VERIFICATION	.pdf	1/24/2017	IR Verification Field Data Sheet
BAUER T5N-R64W-S9 L01_0069_NORMAL	.mp4	1/24/2017	IR Camera Video Normal Operations
BAUER T5N-R64W-S9 L01_0070_DUMP	.mp4	1/24/2017	IR Camera Video During Dump Event
BAUER T5N-R64W-S9 L01_0071_POST	.mp4	1/24/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BAUER T5N-R64W-S9 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BAUER T5N-R64W-S9 L01**

**Consent Decree Tank System Number:** **1676**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,204</b>	<b>2,204</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,939</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>2,939</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>735</b>	<b>3,630</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/16/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/14/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAUER T5N-R64W-S9 L01**

Consent Decree Tank System Number: **1676**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>414</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>43.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,802</b>	<b>1,802</b>
Oil Tank Working Rate	<b>164</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,204</b>	<b>2,204</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAUER T5N-R64W-S9 L01**

Consent Decree Tank System Number: **1676**

**Audit Notes**

**Equalizer Height on Single Tank**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. However the signed eval calculated the surge capacity at 0, so the Engineering Design Standard is considered strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAY ROUSE USX T7N-R64W-S31 L01**

Consent Decree Tank System Number: **1409**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BAY ROUSE USX T7N-R64W-S31 L01_FINAL PACKET	.pdf	10/7/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BAY ROUSE USX T7N-R64W-S31 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/20/2017	STEM Engineering Evaluation Spreadsheet
BAY ROUSE USX T7N-R64W-S31 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BAY ROUSE USX T7N-R64W-S31 L01_FINAL PACKET	.pdf	10/7/2015	Work Request
BAY ROUSE USX T7N-R64W-S31 L01_FINAL PACKET	.pdf	10/7/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BAY ROUSE USX T7N-R64W-S31 L01_WALKDOWN	.pdf	10/16/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BAY ROUSE USX T7N-R64W-S31 L01_IR VERIFICATION	.pdf	10/6/2015	IR Verification Field Data Sheet
BAY ROUSE USX T7N-R64W-S31 L01_0316_NORMAL	.mp4	10/6/2015	IR Camera Video Normal Operations
BAY ROUSE USX T7N-R64W-S31 L01_0317_DUMP	.mp4	10/6/2015	IR Camera Video During Dump Event
BAY ROUSE USX T7N-R64W-S31 L01_0318_POST	.mp4	10/6/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BAY ROUSE USX T7N-R64W-S31 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAY ROUSE USX T7N-R64W-S31 L01**

Consent Decree Tank System Number: **1409**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,928</b>	<b>7,929</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,966</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>27,711</b>	<b>27,711</b>	
Total VCS Capacity (scfh)	<b>31,677</b>	<b>36,911</b>	
VCS Capacity minus PPIVF (scfh)	<b>23,749</b>	<b>28,982</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/16/2018 & 11/26/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAY ROUSE USX T7N-R64W-S31 L01**

Consent Decree Tank System Number: **1409**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,885</b>
Oil Tank Working Rate	<b>328</b>	<b>327</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,929</b>	<b>7,928</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAY ROUSE USX T7N-R64W-S31 L01**

Consent Decree Tank System Number: **1409**

**Audit Notes**

**Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 4-9) are not dated. Date assumed to be same as Facility Scouting Date (6/2/2015).

**1. Confirmation of Headspace Only Tank - Data Request**

The signed Engineering Evaluation indicated a 72% certification maximum fill level based on use of one of the five tanks as a headspace only tank. Neither the Stem Work Request Form nor the Job Sheet specified that a tank was to be "bottomed out." Additionally, the STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks. No additional information was provided to confirm that one tank was isolated from liquid service, thus it is unknown whether or not the Engineering Design Standard was properly applied. **Request confirmation of (1) vapor surge tank onsite.**

**UPDATE 11-26-2018 - Noble provided documentation to confirm an oil tank was put into vapor service onsite. The Engineering Design Standard has been properly applied.**

**2. Oil Dump Valve Size**

The Engineering Evaluation uses a 2" oil dump valve with 1/2" trim on the LP Separator. The Job Sheet (Final Packet, pg 19) confirms the LP Separator onsite has been recently installed and it confirms a 1/2" oil dump trim size. Documentation is not provided which indicates the oil dump valve size is a 2" valve. Given the 1/2" trim size, a 2" valve is the largest valve that be used and is therefore will produce the highest PPIVFR as compared to a smaller valve size. Therefore SLR can confirm the Modeling Guideline is being met with a 2" dump valve size. No action required.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAY T6N-R65W-S1 L02**

Consent Decree Tank System Number: **1340**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BAY T6N-R65W-S1 L02_FINAL PACKET	.pdf	6/9/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BAY T6N-R65W-S1 L02_STEM Engineering Evaluation_rev1	.xlsm	6/15/2017	STEM Engineering Evaluation Spreadsheet
BAY T6N-R65W-S1 L02_SIGNED EVAL	.pdf	6/15/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BAY T6N-R65W-S1 L02_FINAL PACKET	.pdf	6/9/2017	Work Request
BAY T6N-R65W-S1 L02_FINAL PACKET	.pdf	6/9/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BAY T6N-R65W-S1 L02_WALKDOWN	.pdf	6/7/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BAY T6N-R65W-S1 L02_IR VERIFICATION	.pdf	6/7/2017	IR Verification Field Data Sheet
BAY T6N-R65W-S1 L02_2109_NORMAL	.mp4	6/7/2017	IR Camera Video Normal Operations
BAY T6N-R65W-S1 L02_2110_DUMP	.mp4	6/7/2017	IR Camera Video During Dump Event
BAY T6N-R65W-S1 L02_2111_POST	.mp4	6/7/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BAY T6N-R65W-S1 L02_SIGNED EVAL	.pdf	6/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAY T6N-R65W-S1 L02**

Consent Decree Tank System Number: **1340**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>598</b>	<b>1,764</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/16/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/14/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAY T6N-R65W-S1 L02**

Consent Decree Tank System Number: **1340**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	725							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	64.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,670	2,556
Oil Tank Working Rate	287	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BAY T6N-R65W-S1 L02**

Consent Decree Tank System Number: **1340**

**Audit Notes**

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Oil dump valve size unknown**

The STEM Work Request (Final Packet, pg 3) requests a new HLP separator be installed onsite as well as the oil dump valve trim size on that separator to be 1/2". The Job Sheet (Final Packet, pg 19) indicates a new HLP separator was installed onsite however the Job Sheet does indicate the valve size, its does confirm the 1/2" trim size however.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve could be installed and, therefore, the Modeling Guideline cannot be confirmed as being strictly applied. However, assuming a 2" valve size on the separator, the model does not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEAMAN T4N-R65W-S34 L01**

Consent Decree Tank System Number: **1884**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BEAMAN T4N-R65W-S34 L01_FINAL PACKET	.pdf	11/16/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BEAMAN T4N-R65W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	3/15/2016	STEM Engineering Evaluation Spreadsheet
BEAMAN T4N-R65W-S34 L01_SIGNED EVAL	.pdf	3/16/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BEAMAN T4N-R65W-S34 L01_FINAL PACKET	.pdf	11/23/2015	Work Request
BEAMAN T4N-R65W-S34 L01_FINAL PACKET	.pdf	2/25/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BEAMAN T4N-R65W-S34 L01_WALKDOWN	.pdf	3/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BEAMAN T4N-R65W-S34 L01_IR VERIFICATION	.pdf	3/9/2016	IR Verification Field Data Sheet
BEAMAN T4N-R65W-S34 L01_0756_NORMAL	.mp4	3/9/2016	IR Camera Video Normal Operations
BEAMAN T4N-R65W-S34 L01_0757_DUMP	.mp4	3/9/2016	IR Camera Video During Dump Event
BEAMAN T4N-R65W-S34 L01_0758_POST	.mp4	3/9/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BEAMAN T4N-R65W-S34 L01_SIGNED EVAL	.pdf	3/16/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BEAMAN T4N-R65W-S34 L01**

**Consent Decree Tank System Number:** **1884**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,957</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,415</b>	<b>2,415</b>	
Total VCS Capacity (scfh)	<b>5,372</b>	<b>8,248</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,691</b>	<b>4,423</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 12/20/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEAMAN T4N-R65W-S34 L01**

Consent Decree Tank System Number: **1884**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	3,825	3,681

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEAMAN T4N-R65W-S34 L01**

Consent Decree Tank System Number: **1884**

**Audit Notes**

The Work Request, pg. 3 requests the existing dump valve be changed out for 1" valve with a 1/2" trim. The Job Sheet, pg. 20 of the Final Packet, indicates that the work crew "Changed out Dump." The new LP Separator oil dump valve body size is not indicated within the provided documentation. The LP Separator dump valve trim size is confirmed as 1/2" per the Walkdown Checklist, Item A1. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The Signed Evaluation indicated tank vapor lines were to be 3" in size. The Work Request on Page 3 of the Final Packet requested the existing 2" line to be replaced with 3" line on top of the tanks. The provided documentation does not indicate this change was made. A data request received by Noble on 8/14/2018 indicates that on or around 3/14/16, field verification confirmed the 3" line from tanks to knockout drum was installed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BECCA CODY T3N-R64W-S3 L01**

Consent Decree Tank System Number: **516-b**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BECCA CODY T3N-R64W-S3 L01_FINAL PACKET	.pdf	9/2/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BECCA CODY T3N-R64W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	12/20/2016	STEM Engineering Evaluation Spreadsheet
BECCA CODY T3N-R64W-S3 L01_SIGNED EVAL	.pdf	1/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BECCA CODY T3N-R64W-S3 L01_FINAL PACKET	.pdf	9/2/2015	Work Request
BECCA CODY T3N-R64W-S3 L01_FINAL PACKET	.pdf	9/2/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BECCA CODY T3N-R64W-S3 L01_WALKDOWN	.pdf	9/2/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BECCA CODY T3N-R64W-S3 L01_IR VERIFICATION	.pdf	9/1/2015	IR Verification Field Data Sheet
BECCA CODY T3N-R64W-S3 L01_0179_NORMAL	.mp4	8/31/2015	IR Camera Video Normal Operations
BECCA CODY T3N-R64W-S3 L01_0180_DUMP	.mp4	8/31/2015	IR Camera Video During Dump Event
BECCA CODY T3N-R64W-S3 L01_0181_POST	.mp4	8/31/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BECCA CODY T3N-R64W-S3 L01_SIGNED EVAL	.pdf	1/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BECCA CODY T3N-R64W-S3 L01**

Consent Decree Tank System Number: **516-b**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,109</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>1,423</b>	<b>1,423</b>	
Total VCS Capacity (scfh)	<b>6,532</b>	<b>7,965</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,024</b>	<b>3,456</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/12/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/2/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BECCA CODY T3N-R64W-S3 L01**

Consent Decree Tank System Number: **516-b**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BECCA CODY T3N-R64W-S3 L01**

Consent Decree Tank System Number: **516-b**

**Audit Notes**

The field data sheets (PG 13 of FINAL PACKET pdf) verify the VOC line from tank to KO to be 2" while the stem design form (PG 7 of Final Packet pdf), signed eval, and stem engineering evaluation show that line to be 3". Nowhere in the work request does it state the line was to be changed from 2" to 3" nor does it state in the job sheets that work was completed on the VOC line from tank to ko to change from 2" to 3".

Field sheets indicate there is a 2" VOC line from tank to KO, which is smaller than the 3" used in the Evaluation; if so the Control System Capacity is overestimated, but is sufficient for peak when using 2" or 3".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** BEEBE DRAW T4N-R65W-S26 L04

**Consent Decree Tank System Number:** 1294/1284

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_FINAL PACKET	.pdf	5/1/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_STEM Eval_rev1	.xlsm	5/2/2017	STEM Engineering Evaluation Spreadsheet
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_SIGNED EVAL	.pdf	5/4/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_FINAL PACKET	.pdf	5/1/2017	Work Request
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_FINAL PACKET	.pdf	5/1/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_WALKDOWN	.pdf	5/1/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_IR VERIFI	.pdf	11/17/2017	IR Verification Field Data Sheet
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_1987_NORMAL	.mp4	4/28/2017	IR Camera Video Normal Operations
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_1988_DUMP	.mp4	4/28/2017	IR Camera Video During Dump Event
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_1989_POST	.mp4	4/28/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BEEBE DRAW T4N-R65W-S26 L04 & DUPPER ARENS T4N-R65W-S26 L01_SIGNED EVAL	.pdf	5/4/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BEEBE DRAW T4N-R65W-S26 L04**

**Consent Decree Tank System Number:** **1294/1284**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>15,712</b>	<b>15,712</b>	
Total VCS Capacity (scfh)	<b>19,710</b>	<b>20,670</b>	
VCS Capacity minus PPIVF (scfh)	<b>15,202</b>	<b>15,982</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEEBE DRAW T4N-R65W-S26 L04**

Consent Decree Tank System Number: **1294/1284**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEEBE DRAW T4N-R65W-S26 L04**

Consent Decree Tank System Number: **1294/1284**

**Audit Notes**

No confirmation the VOC line on top of the tank(s) was modified to a 3" line from the original 2" line.

NEI data request response received 5/16/2018 indicated:

Field verification for this facility was completed on or around 3/22/2017, field verification confirmed that the 4" AGL line from KO to burner was installed.

A new HLP separator was brought on-site to replace the existing. Could not verify the oil dump valve size (2" or 1") of the new HLP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEEBE MOSER UPRR T3N-R65W-S3 L01**

Consent Decree Tank System Number: **2318**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BEEBE MOSER UPRR T3N-R65W-S3 L01_FINAL PACKET	.pdf	5/12/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BEEBE MOSER UPRR T3N-R65W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	6/14/2017	STEM Engineering Evaluation Spreadsheet
BEEBE MOSER UPRR T3N-R65W-S3 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BEEBE MOSER UPRR T3N-R65W-S3 L01_FINAL PACKET	.pdf	5/12/2017	Work Request
BEEBE MOSER UPRR T3N-R65W-S3 L01_FINAL PACKET	.pdf	5/12/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BEEBE MOSER UPRR T3N-R65W-S3 L01_WALKDOWN	.pdf	5/12/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BEEBE MOSER UPRR T3N-R65W-S3 L01_IR VERIFICATION	.pdf	5/11/2017	IR Verification Field Data Sheet
BEEBE MOSER UPRR T3N-R65W-S3 L01_2035_NORMAL	.mp4	5/9/2017	IR Camera Video Normal Operations
BEEBE MOSER UPRR T3N-R65W-S3 L01_2036_DUMP	.mp4	5/9/2017	IR Camera Video During Dump Event
BEEBE MOSER UPRR T3N-R65W-S3 L01_2037_POST	.mp4	5/9/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BEEBE MOSER UPRR T3N-R65W-S3 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** BEEBE MOSER UPRR T3N-R65W-S3 L01

**Consent Decree Tank System Number:** 2318

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	400
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,147	3,148	0%
Calculated Burner Capacity (scfh)	3,953	4,958	
Headspace Surge Capacity (scfh)	782	758	
Total VCS Capacity (scfh)	4,735	5,716	
VCS Capacity minus PPIVF (scfh)	1,588	2,568	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/12/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/13/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEEBE MOSER UPRR T3N-R65W-S3 L01**

Consent Decree Tank System Number: **2318**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>317</b>	<b>0</b>
Mscfd	<b>8</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>317</b>	<b>317</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,148</b>	<b>3,147</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEEBE MOSER UPRR T3N-R65W-S3 L01**

Consent Decree Tank System Number: **2318**

**Audit Notes**

4" VOC line was installed from KO to Burner but Noble used a 3" line in model. Using the smaller pipe diameter underestimated VCS capacity and therefore the engineering design standard was still strictly followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEELER T4N-R67W-S22 L02**

Consent Decree Tank System Number: **1743**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BEELER T4N-R67W-S22 L02_FINAL PACKET	.pdf	8/15/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BEELER T4N-R67W-S22 L02_STEM Engineering Evaluation_rev1	.xlsm	8/15/2017	STEM Engineering Evaluation Spreadsheet
BEELER T4N-R67W-S22 L02_SIGNED EVAL	.pdf	8/24/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BEELER T4N-R67W-S22 L02_FINAL PACKET	.pdf	8/15/2017	Work Request
BEELER T4N-R67W-S22 L02_FINAL PACKET	.pdf	8/15/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BEELER T4N-R67W-S22 L02_FINAL PACKET	.pdf	8/15/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BEELER T4N-R67W-S22 L02_IR VERIFICATION	.pdf	8/15/2017	IR Verification Field Data Sheet
BEELER T4N-R67W-S22 L02_2278_NORMAL	.mp4	8/11/2017	IR Camera Video Normal Operations
BEELER T4N-R67W-S22 L02_2279_DUMP	.mp4	8/11/2017	IR Camera Video During Dump Event
BEELER T4N-R67W-S22 L02_2280_POST	.mp4	8/11/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BEELER T4N-R67W-S22 L02_SIGNED EVAL	.pdf	8/24/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BEELER T4N-R67W-S22 L02**

**Consent Decree Tank System Number:** **1743**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>602</b>	<b>602</b>	
Total VCS Capacity (scfh)	<b>3,973</b>	<b>5,560</b>	
VCS Capacity minus PPIVF (scfh)	<b>905</b>	<b>2,491</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEELER T4N-R67W-S22 L02**

Consent Decree Tank System Number: **1743**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BEELER T4N-R67W-S22 L02**

Consent Decree Tank System Number: **1743**

**Audit Notes**

The stem work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 22-26 of the Final Packet) does it confirm this task was completed  
Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 4/25/2017, field verification confirmed that the 3" VOC line from the tank to the KO pot was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BELL USX T2N-R64W-S29 L01**

Consent Decree Tank System Number: **1959**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BELL USX T2N-R64W-S29 L01_FINAL PACKET	.pdf	9/1/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BELL USX T2N-R64W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	3/20/2017	STEM Engineering Evaluation Spreadsheet
BELL USX T2N-R64W-S29 L01_SIGNED EVAL	.pdf	3/20/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BELL USX T2N-R64W-S29 L01_FINAL PACKET	.pdf	9/1/2017	Work Request
BELL USX T2N-R64W-S29 L01_FINAL PACKET	.pdf	9/1/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BELL USX T2N-R64W-S29 L01_WALKDOWN	.pdf	2/27/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BELL USX T2N-R64W-S29 L01_IR VERIFICATION	.pdf	2/27/2017	IR Verification Field Data Sheet
BELL USX T2N-R64W-S29 L01_0130_NORMAL	.mp4	2/27/2017	IR Camera Video Normal Operations
BELL USX T2N-R64W-S29 L01_0131_DUMP	.mp4	2/27/2017	IR Camera Video During Dump Event
BELL USX T2N-R64W-S29 L01_0133_POST	.mp4	2/27/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BELL USX T2N-R64W-S29 L01_SIGNED EVAL	.pdf	3/20/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BELL USX T2N-R64W-S29 L01**

Consent Decree Tank System Number: **1959**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,436</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,371</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>935</b>	<b>2,522</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 1/24/2018  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 2/8/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BELL USX T2N-R64W-S29 L01**

Consent Decree Tank System Number: **1959**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>431</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>48.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,027</b>	<b>2,027</b>
Oil Tank Working Rate	<b>171</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,436</b>	<b>2,436</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BELL USX T2N-R64W-S29 L01**

Consent Decree Tank System Number: **1959**

**Audit Notes**

**1. Facility walkdown checklist inconsistencies**

The STEM Walkdown Checklist (Final Packet, pg 28) has Item C6 checked "yes" indicating that multiple HP oil dumps tie into a single LP Separator. This site consists of one HP Separator and therefore multiple HP oil dumps do not exist onsite and therefore Item C6 is incorrectly checked "yes".

**2. Inconsistent Separator Max Operating Pressure**

The STEM Work Request (Final Packet, pg 3) requests the LP Separator be set to operate at 70 psi and the Engineering Evaluation (Signed Eval, pg 2) shows the max LP Separator pressure to be set at 70 psi. The QC STEM Checkout (Final Packet, pg 25) shows the LP Separator is set at 65 psi. A 65 psi LP Separator set pressure will overestimate PPIVFR as compared to a 70 psi set pressure, therefore Noble is meeting the Modeling Guideline.

**3. Unknown Oil Dump valve size and trim size - Request additional data**

A new LP Separator was installed onsite with an unknown oil dump valve and trim size. The STEM Work Request Form (Final Packet, pg 3) requests a 3/8" oil dump valve trim to be installed. No documentation is provided to confirm a 3/8" oil dump valve trim in the separator.

A 1" oil dump valve was used in Noble's Engineering Evaluation for this site, no documentation is provided to confirm a 1" oil dump valve is currently onsite.

**Request additional data to confirm oil dump valve size and trim size** - Item A1 of the STEM Walkdown Checklist (Final Packet, pg 26) indicates the oil dump valve trim used in the evaluation is accurate. Due to SLR putting in the effort to request the oil dump valve size, SLR is also requesting the valve trim size be confirmed beyond Item A1 in the Walkdown Checklist.

**4. Combustors - Documentation does not show existing combustor onsite as being removed**

Field Datasheet (Final Packet pg 14) shows an existing LEED combustor previously onsite. The STEM Work Request (Final Packet, pg 3) request the existing LEED burner be replaced with a LEED EC48-2S burner and the Job Sheet (Final Packet pg 20-21) confirm the new LEED EC48-2S was installed onsite. No documentation is provided to show the existing LEED combustor was disconnected and removed from site. Given the above information SLR determined number and model of combustors onsite to be correct and accurate.

**5. Field Datasheets**

The Field Datasheets (Final Packet pg 10-15) are not dated. Assumed the date is the same as Facility Scouting date (9/2/2016).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BERIG ST T4N-R66W-S36 L02**

Consent Decree Tank System Number: **162/889**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_FINAL PACKET	.pdf	12/21/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_SIGNED EVAL	.pdf	2/15/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_FINAL PACKET	.pdf	12/21/2017	Work Request
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_FINAL PACKET	.pdf	12/21/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_WALKDOWN	.pdf	12/18/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_IR VERIFICATION	.pdf	12/18/2017	IR Verification Field Data Sheet
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_1388_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_1389_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_1390_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BERIG ST T4N-R66W-S36 L02 & BERIG ST T4N-R66W-S36 L03_SIGNED EVAL	.pdf	2/15/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BERIG ST T4N-R66W-S36 L02**

Consent Decree Tank System Number: **162/889**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>19,973</b>	<b>19,973</b>	
Total VCS Capacity (scfh)	<b>24,062</b>	<b>24,573</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,980</b>	<b>20,490</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/19/2018 & 12/13/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 12/14/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BERIG ST T4N-R66W-S36 L02**

Consent Decree Tank System Number: **162/889**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	4,083	4,082
-------	-------	-------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BERIG ST T4N-R66W-S36 L02**

Consent Decree Tank System Number: **162/889**

**Audit Notes**

**Vapor Surge Vessel - Request Additional Data**

The Engineering Evaluation indicates (2) tanks are onsite, (1) being an oil tank and the other being a vapor surge vessel. The Signed Walkdown (Final Packet, pg 28) confirms (2) tanks onsite, however check C14 of the STEM Walkdown Checklist is checked "yes" indicating the separator onsite is configured to be able to produce into all tanks onsite. This indicates that a vapor surge vessel is not currently onsite.

**Request confirmation of a vapor surge vessel onsite.**

**UPDATE 12/13/2018 - Nobel confirmed via data request that an existing oil tank onsite was converted to a vapor surge vessel, and therefore a vapor surge vessel does exist onsite.**

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01**

Consent Decree Tank System Number: **175**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_FINAL PACKET	.pdf	6/1/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_STEM Engineer Evalu_rev1	.xlsm	7/5/2016	STEM Engineering Evaluation Spreadsheet
L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_FINAL PACKET	.pdf	6/1/2016	Work Request
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_FINAL PACKET	.pdf	6/1/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_WALKDOWN	.pdf	6/1/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_IR VERIFICATION	.pdf	6/1/2016	IR Verification Field Data Sheet
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_0953_NORMAL	.mp4	5/31/2016	IR Camera Video Normal Operations
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_0954_DUMP	.mp4	5/31/2016	IR Camera Video During Dump Event
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_0955_POST	.mp4	5/31/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01**

**Consent Decree Tank System Number:** **175**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,907</b>	<b>12,909</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>80,891</b>	<b>80,891</b>	
Total VCS Capacity (scfh)	<b>83,818</b>	<b>86,724</b>	
VCS Capacity minus PPIVF (scfh)	<b>70,911</b>	<b>73,815</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 12/11/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 12/15/2017



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01**

Consent Decree Tank System Number: **175**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	
scfh vapor/tank <sup>l</sup>	<b>317</b>	
Mscfd	<b>15</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>634</b>	<b>634</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>12,909</b>	<b>12,907</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01**

**Consent Decree Tank System Number:** **175**

**Audit Notes**

The walkdown checklist was not marked as complete. Completion was verified through other documentation in the final packet.

The Job sheet (5/11/16 BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01\_FINAL PACKET, p 23) states the PSHH should be set to 60 psig. The signed eval (6/27/16 BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01\_SIGNED EVAL, p 2) & QC Stem Checkout (5/23/16 BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01\_FINAL PACKET, p 27 ) states it was set to 70 psig. The STEM model was run at 70 psig. While considered inconsistent for inventory purposes, this does not lead to an underestimation in PPIVF.

The Jobsheet (5/11/16 BERNHARDT KAMMERZELL GREENHEAD T4N-R66W-S7 L01\_FINAL PACKET, p 23) states one oil tank was converted to a headspace tank. Since the max fill of the oil tanks is 90% of capacity, the max capacity with the new headspace tank should be 45%, but was completed in the Engineering Evaluation at 50%. This leads to an underestimation of Control System Capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ REICHERT T4N-R65W-S9 L01**

Consent Decree Tank System Number: **258**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BETZ REICHERT T4N-R65W-S9 L01_FINAL PACKET	PDF	NO DATE	Field Datasheet

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BETZ REICHERT T4N-R65W-S9 L01_SIGNED EVAL	PDF	5/3/2017	Engineering Evaluation Summary

Modification Documents:

File Name	File Ext.	File Date	Document Description
BETZ REICHERT T4N-R65W-S9 L01_FINAL PACKET	PDF	12/1/2016	STEM Work Request Form
BETZ REICHERT T4N-R65W-S9 L01_FINAL PACKET	PDF	2/1/2017	Job Sheet

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BETZ REICHERT T4N-R65W-S9 L01_FINAL PACKET	PDF	4/24/2017	STEM Retrofit Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BETZ REICHERT T4N-R65W-S9 L01_FINAL PACKET	PDF	4/24/2017	IR Camera Verification Documentation Field Data Sheet
BETZ REICHERT T4N-R65W-S9 L01_1978_NORMAL	MP4	4/24/2017	IR Video NORMAL
BETZ REICHERT T4N-R65W-S9 L01_1979_DUMP	MP4	4/24/2017	IR Video DUMP
BETZ REICHERT T4N-R65W-S9 L01_1980_POST	MP4	4/24/2017	IR Video POST

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BETZ REICHERT T4N-R65W-S9 L01_SIGNED EVAL	PDF	5/3/2017	Engineering Evaluation Summary

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** BETZ REICHERT T4N-R65W-S9 L01  
**Consent Decree Tank System Number:** 258

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>20,853</b>	<b>20,853</b>	
Total VCS Capacity (scfh)	<b>23,578</b>	<b>26,686</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,070</b>	<b>22,177</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Erin Ehrmantraut  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 11/7/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ REICHERT T4N-R65W-S9 L01**

Consent Decree Tank System Number: **258**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ REICHERT T4N-R65W-S9 L01**

Consent Decree Tank System Number: **258**

**Audit Notes**

-Water tanks are not controlled by flare, per Field Datasheet Drawing, P. 11 of FINAL PACKET  
-Site Modified to have LP and HP Separator, instead of 2 HP seps.  
-1 Vapor Space Tank. Only used 1 OT (out of 2) in calcs.  
-Unclear: Job Sheet (p. 21 of FINAL PACKET), states: "Installed 4" AGL to VOC Burner." The SIGNED EVAL shows that the 4" AGL is only from KO to Burner. As this is conservative, and Job Sheet was unclear, assumed 4" line was installed from KO to Burner, and not for all VCS lines.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ ST T4N-R65W-S9 L01**

Consent Decree Tank System Number: **271**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BETZ ST T4N-R65W-S9 L01_FINAL PACKET	.pdf	10/19/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BETZ ST T4N-R65W-S9 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
BETZ ST T4N-R65W-S9 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BETZ ST T4N-R65W-S9 L01_FINAL PACKET	.pdf	10/19/2015	Work Request
BETZ ST T4N-R65W-S9 L01_FINAL PACKET	.pdf	10/19/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BETZ ST T4N-R65W-S9 L01_WALKDOWN	.pdf	10/13/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BETZ ST T4N-R65W-S9 L01_IR VERIFICATION	.pdf	10/13/2015	IR Verification Field Data Sheet
BETZ ST T4N-R65W-S9 L01_0341_NORMAL	.mp4	10/13/2015	IR Camera Video Normal Operations
BETZ ST T4N-R65W-S9 L01_0342_DUMP	.mp4	10/13/2015	IR Camera Video During Dump Event
BETZ ST T4N-R65W-S9 L01_0343_POST	.mp4	10/13/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BETZ ST T4N-R65W-S9 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** BETZ ST T4N-R65W-S9 L01

**Consent Decree Tank System Number:** 271

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>400</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>18,251</b>	<b>18,252</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,392</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>26,959</b>	<b>26,959</b>	
Total VCS Capacity (scfh)	<b>33,351</b>	<b>31,512</b>	
VCS Capacity minus PPIVF (scfh)	<b>15,100</b>	<b>13,260</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/19/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ ST T4N-R65W-S9 L01**

Consent Decree Tank System Number: **271**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	1739	3906						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	7	16						
Working Flow (Mscfd) <sup>l</sup>	10	22						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	23	6

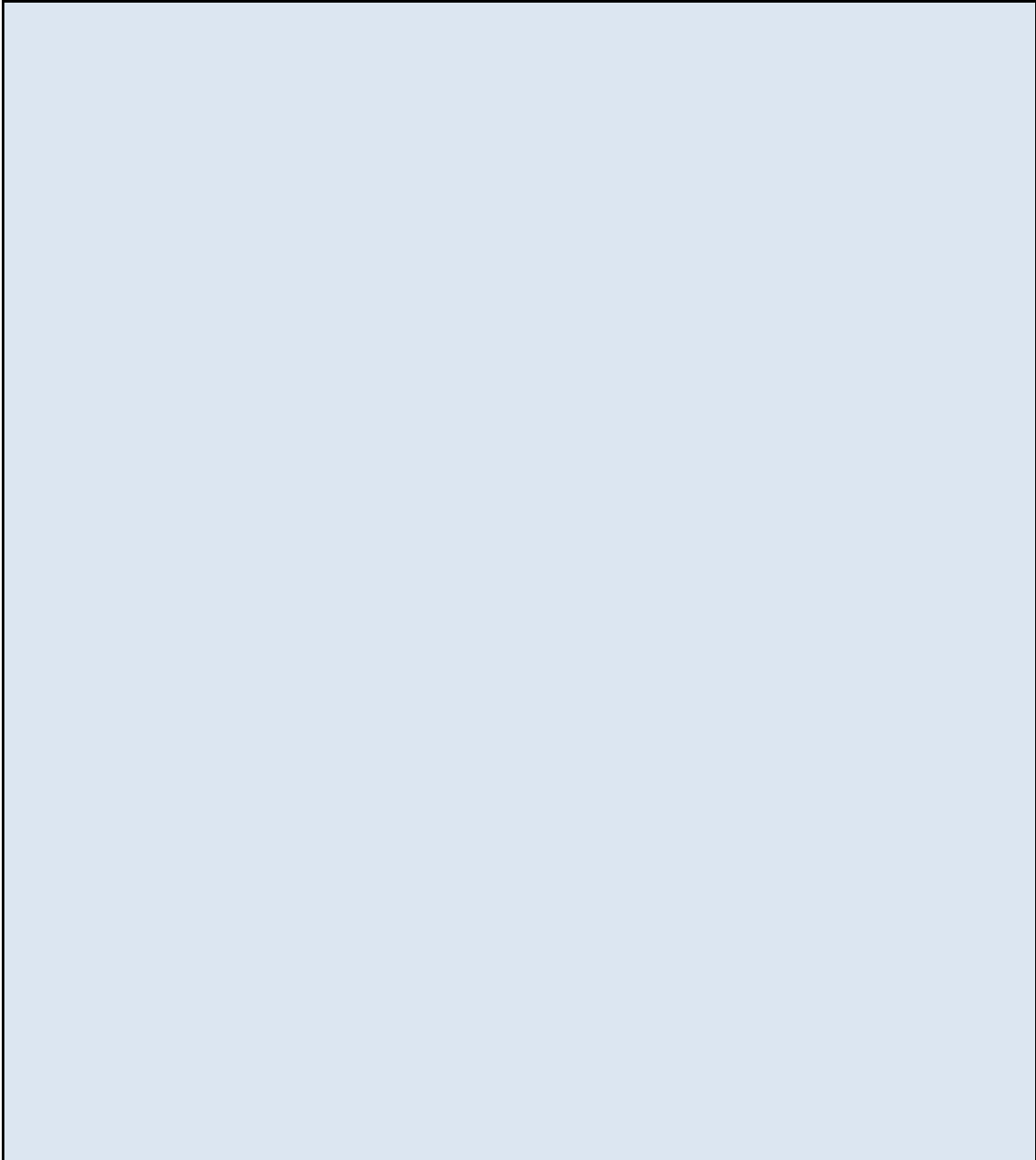
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	941	941
Water Tank Working Rate	1,321	1,321
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	2,527	2,527
Total	18,252	18,251

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ ST T4N-R65W-S9 L01**

Consent Decree Tank System Number: **271**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ T4N-R65W-S9 L01**

Consent Decree Tank System Number: **270**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BETZ T4N-R65W-S9 L01_FINAL PACKET	.pdf	9/8/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BETZ T4N-R65W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
BETZ T4N-R65W-S9 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BETZ T4N-R65W-S9 L01_FINAL PACKET	.pdf	9/8/2017	Work Request
BETZ T4N-R65W-S9 L01_FINAL PACKET	.pdf	9/8/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BETZ T4N-R65W-S9 L01_WALKDOWN	.pdf	6/24/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BETZ T4N-R65W-S9 L01_IR VERIFICATION	.pdf	6/23/2016	IR Verification Field Data Sheet
BETZ T4N-R65W-S9 L01_1179_NORMAL	.mp4	6/22/2016	IR Camera Video Normal Operations
BETZ T4N-R65W-S9 L01_1180_DUMP	.mp4	6/22/2016	IR Camera Video During Dump Event
BETZ T4N-R65W-S9 L01_1181_POST	.mp4	6/22/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BETZ T4N-R65W-S9 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** BETZ T4N-R65W-S9 L01

**Consent Decree Tank System Number:** 270

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,489</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,621</b>	<b>21,621</b>	
Total VCS Capacity (scfh)	<b>24,110</b>	<b>27,454</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,602</b>	<b>22,766</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Jesse Hanshaw  
 Audit Document Review Date: 12/9/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 4/23/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ T4N-R65W-S9 L01**

Consent Decree Tank System Number: **270**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	827							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	3,885	3,720
Oil Tank Working Rate	328	313
Water Tank Flash Rate	0	
Water Tank Working Rate	0	
Tank Breathing Rate	475	475
Truck Loading Vapor	0	
Total	4,689	4,508



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BETZ T4N-R65W-S9 L01**

Consent Decree Tank System Number: **270**

**Audit Notes**

-A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BILL T6N-R65W-S36 L01**

**Consent Decree Tank System Number:** **1961**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BILL T6N-R65W-S36 L01_FINAL PACKET	.pdf	8/15/2015	Pre-Evaluation Facility Inspection
072_BILL T6N-R65W-S36 L01 TLO Final Packet	.pdf	5/18/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BILL T6N-R65W-S36 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	11/29/2017	STEM Engineering Evaluation Spreadsheet
BILL T6N-R65W-S36 L01_SIGNED EVAL	.pdf	12/5/2017	Final Signed Engineering Evaluation
072_BILL T6N-R65W-S36 L01 TLO Final Packet	.pdf	5/18/2018	Pre-Evaluation Facility Inspection

Modification Documents:

File Name	File Ext.	File Date	Document Description
BILL T6N-R65W-S36 L01_FINAL PACKET	.pdf	8/15/2015	Work Request
BILL T6N-R65W-S36 L01_FINAL PACKET	.pdf	8/15/2015	Construction Jobsheets
072_BILL T6N-R65W-S36 L01 TLO Final Packet	.pdf	5/18/2018	Pre-Evaluation Facility Inspection

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BILL T6N-R65W-S36 L01_FINAL PACKET	.pdf	8/15/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BILL T6N-R65W-S36 L01_IR VERIFICATION	.pdf	8/14/2015	IR Verification Field Data Sheet
BILL T6N-R65W-S36 L01_0215_NORMAL	.mp4	8/10/2015	IR Camera Video Normal Operations
BILL T6N-R65W-S36 L01_0216_DUMP	.mp4	8/10/2015	IR Camera Video During Dump Event
BILL T6N-R65W-S36 L01_0217_POST	.mp4	8/10/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BILL T6N-R65W-S36 L01_SIGNED EVAL	.pdf	12/5/2017	Final Signed Engineering Evaluation
072_BILL T6N-R65W-S36 L01 TLO Final Packet	.pdf	5/18/2018	Pre-Evaluation Facility Inspection



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BILL T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1961**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>15,751</b>	<b>15,753</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,842</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>77,846</b>	<b>77,846</b>	
Total VCS Capacity (scfh)	<b>81,688</b>	<b>82,399</b>	
VCS Capacity minus PPIVF (scfh)	<b>65,937</b>	<b>66,646</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 2/20/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/19/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BILL T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1961**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>15,753</b>	<b>15,751</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BILL T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1961**

**Audit Notes**

The field notes (FINAL PACKET pg. 6) show that one of the water tanks was connected to the VCS. This is not accounted for in the signed evaluation, and there is no verification that it has been taken out of service (FINAL PACKET pg. 14-26). In response to a data request, Noble provided additional data on 5/18/2018 that no water tanks are connected to the VCS.

There was a work request to disconnect 1 tank from the fill header in order to be used for headspace. The Jobsheet does not indicate that one tank was bottomed out. In response to a data request, Noble provided additional data on 5/18/2018 confirming that one tank was disconnected from the fill header in order to be used as headspace tank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BIRD ZABKA T4N-R66W-S20 L01**

Consent Decree Tank System Number: **173**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BIRD ZABKA T4N-R66W-S20 L01_FINAL PACKET	.pdf	6/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BIRD ZABKA T4N-R66W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
BIRD ZABKA T4N-R66W-S20 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BIRD ZABKA T4N-R66W-S20 L01_FINAL PACKET	.pdf	6/16/2016	Work Request
BIRD ZABKA T4N-R66W-S20 L01_FINAL PACKET	.pdf	6/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BIRD ZABKA T4N-R66W-S20 L01_WALKDOWN	.pdf	6/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BIRD ZABKA T4N-R66W-S20 L01_IR VERIFICATION	.pdf	6/14/2016	IR Verification Field Data Sheet
BIRD ZABKA T4N-R66W-S20 L01_1090_NORMAL	.mp4	6/3/2016	IR Camera Video Normal Operations
BIRD ZABKA T4N-R66W-S20 L01_1091_DUMP	.mp4	6/3/2016	IR Camera Video During Dump Event
BIRD ZABKA T4N-R66W-S20 L01_1092_POST	.mp4	6/3/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BIRD ZABKA T4N-R66W-S20 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BIRD ZABKA T4N-R66W-S20 L01**

Consent Decree Tank System Number: **173**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>23,277</b>	<b>23,277</b>	
Total VCS Capacity (scfh)	<b>26,648</b>	<b>27,877</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,902</b>	<b>23,130</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 12/11/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 12/15/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BIRD ZABKA T4N-R66W-S20 L01**

Consent Decree Tank System Number: **173**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BIRD ZABKA T4N-R66W-S20 L01**

Consent Decree Tank System Number: **173**

**Audit Notes**

The walkdown checklist was not marked as complete. Completion was verified through other documentation in the final packet.

The job sheet (5/11/16 BIRD ZABKA T4N-R66W-S20 L01\_FINAL PACKET, p 23) states the PSHH should be set to 60 psig. The signed eval (6/27/16 BIRD ZABKA T4N-R66W-S20 L01\_SIGNED EVAL, p 2) & QC Stem Checkout (5/18/16 BIRD ZABKA T4N-R66W-S20 L01\_FINAL PACKET, p 28 ) states it was set to 70 psig. The STEM model was run at 70 psig.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOCKIUS PFANNEBECKER T4N-R64W-S15 L01**

**Consent Decree Tank System Number:** **638**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_FINAL PACKET	.pdf	4/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_STEM Engineering Evaluation_rev1	.xlsm	4/26/2017	STEM Engineering Evaluation Spreadsheet
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_SIGNED EVAL	.pdf	4/28/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_FINAL PACKET	.pdf	4/20/2017	Work Request
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_FINAL PACKET	.pdf	4/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_WALKDOWN	.pdf	4/20/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_1953_NORMAL	.mp4	4/18/2017	IR Camera Video Normal Operations
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_1954_DUMP	.mp4	4/18/2017	IR Camera Video During Dump Event
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_1955_POST	.mp4	4/18/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_SIGNED EVAL	.pdf	4/28/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOCKIUS PFANNEBECKER T4N-R64W-S15 L01**

**Consent Decree Tank System Number:** **638**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,919</b>	<b>3,920</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>3,747</b>	<b>3,747</b>	
Total VCS Capacity (scfh)	<b>7,118</b>	<b>8,347</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,199</b>	<b>4,427</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/11/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/11/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOCKIUS PFANNEBECKER T4N-R64W-S15 L01**

Consent Decree Tank System Number: **638**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

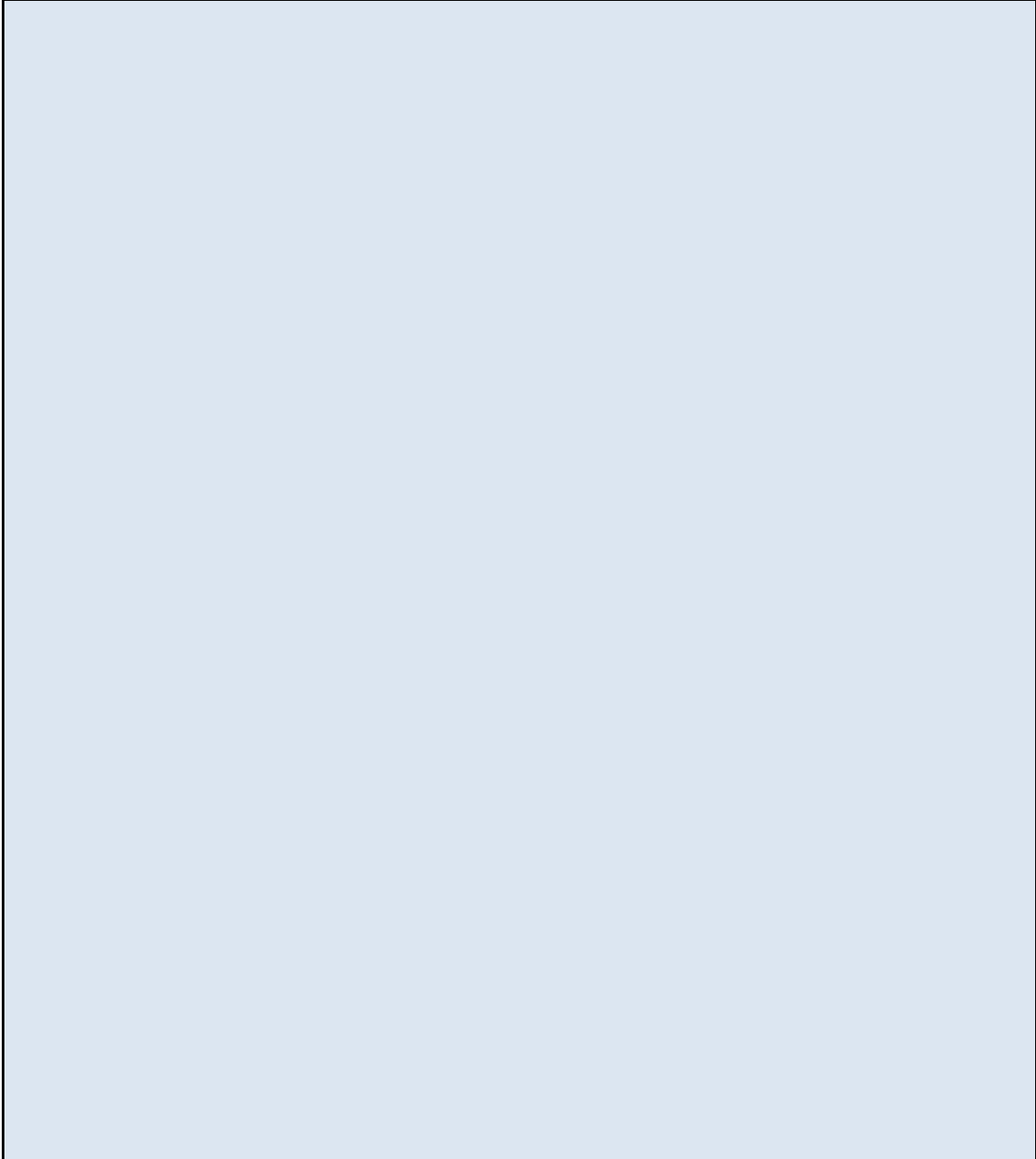
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,920</b>	<b>3,919</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOCKIUS PFANNEBECKER T4N-R64W-S15 L01**

Consent Decree Tank System Number: **638**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03**

**Consent Decree Tank System Number:** **719/720**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_FINAL PACKET	pdf	5/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_STEM Engineering Evaluation_rev1	xlsx	5/16/2017	STEM Engineering Evaluation Spreadsheet
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_SIGNED EVAL	pdf	5/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_FINAL PACKET	pdf	5/10/2017	Work Request
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_FINAL PACKET	pdf	5/10/2017	Jobsheet

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_WALKDOWN	pdf	5/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_IR VERIFICATION	pdf	5/9/2017	IR Verification Field Data Sheet
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_2021_NORMAL	mp4	5/8/2017	IR Camera Video Normal Operations
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_2022_DUMP	mp4	5/8/2017	IR Camera Video During Dump Event
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_2023_POST	mp4	5/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03_SIGNED EVAL	pdf	5/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03**

Consent Decree Tank System Number: **719/720**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>2,204</b>	<b>2,325</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>2,812</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>86</b>	<b>86</b>	
Total VCS Capacity (scfh)	<b>2,898</b>	<b>5,919</b>	
VCS Capacity minus PPIVF (scfh)	<b>694</b>	<b>3,594</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/19/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03**

Consent Decree Tank System Number: **719/720**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>440</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>45.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,913</b>	<b>1,802</b>
Oil Tank Working Rate	<b>174</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,325</b>	<b>2,204</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03**

**Consent Decree Tank System Number:** **719/720**

**Audit Notes**

The walkdown checklist not marked as being completed. The site was verified through other supplied documentation in the final packet.

Per the Work Request (BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03\_FINAL PACKET.pdf, pg. 5) a new LP Separator was to be installed on site. The job sheet (BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03\_FINAL PACKET.pdf, pg 31) confirms a LP separator was installed but it does not indicate the oil dump valve size or trim. A1 of the Final Walkdown (BOEHNER T4N-R65W-S8 L02 & BOEHNER T4N-R65W-S8 L03\_FINAL PACKET.pdf, pg 37) indicates the trim has been verified, but no documentation on the actual valve size. A 2" valve was used in these calculations to be conservative. It is unknown if the modeling guideline was strictly followed for the tank system.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOHLENDER T4N-R65W-S29 L02**

Consent Decree Tank System Number: **820/818**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_FINAL PACKET	.pdf	12/16/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_STEM Engineering Evaluation_rev1	.xlsm	1/3/2017	STEM Engineering Evaluation Spreadsheet
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_SIGNED EVAL	.pdf	1/3/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_FINAL PACKET	.pdf	12/16/2016	Work Request
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_FINAL PACKET	.pdf	12/16/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_WALKDOWN	.pdf	12/15/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_IR VERIFICATION	.pdf	12/15/2016	IR Verification Field Data Sheet
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_1716_NORMAL	.mp4	12/15/2016	IR Camera Video Normal Operations
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_1717_DUMP	.mp4	12/15/2016	IR Camera Video During Dump Event
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_1718_POST	.mp4	12/15/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BOHLENDER T4N-R65W-S29 L02 & L03 & L01_SIGNED EVAL	.pdf	1/3/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOHLENDER T4N-R65W-S29 L02**

**Consent Decree Tank System Number:** **820/818**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>222</b>	<b>1,371</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOHLENDER T4N-R65W-S29 L02**

Consent Decree Tank System Number: **820/818**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOHLENDER T4N-R65W-S29 L02**

Consent Decree Tank System Number: **820/818**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Field Datasheets (Final Packet, pg 29) shows the separator (SN: 22831) originally had a 2" oil dump valve with unknown trim size. ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 52) is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation, and is therefore a 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm a 1" valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOHOA SUN SOIL T4N-R65W-S14 L01**

Consent Decree Tank System Number: **2126**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOHOA SUN SOIL T4N-R65W-S14 L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOHOA SUN SOIL T4N-R65W-S14 L01_STEM Engineering Evaluation_rev1	.xlsm	8/18/2017	STEM Engineering Evaluation Spreadsheet
BOHOA SUN SOIL T4N-R65W-S14 L01_SIGNED EVAL	.pdf	8/29/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOHOA SUN SOIL T4N-R65W-S14 L01_FINAL PACKET	.pdf	8/4/2017	Work Request
BOHOA SUN SOIL T4N-R65W-S14 L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOHOA SUN SOIL T4N-R65W-S14 L01_WALKDOWN	.pdf	8/4/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOHOA SUN SOIL T4N-R65W-S14 L01_IR VERIFICATION	.pdf	8/4/2017	IR Verification Field Data Sheet
BOHOA SUN SOIL T4N-R65W-S14 L01_2208_NORMAL	.mp4	8/3/2017	IR Camera Video Normal Operations
BOHOA SUN SOIL T4N-R65W-S14 L01_2209_DUMP	.mp4	8/3/2017	IR Camera Video During Dump Event
BOHOA SUN SOIL T4N-R65W-S14 L01_2210_POST	.mp4	8/3/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOHOA SUN SOIL T4N-R65W-S14 L01_SIGNED EVAL	.pdf	8/29/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOHOA SUN SOIL T4N-R65W-S14 L01**

**Consent Decree Tank System Number:** **2126**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,824</b>	<b>3,825</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,795</b>	<b>2,795</b>	
Total VCS Capacity (scfh)	<b>5,722</b>	<b>8,628</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,898</b>	<b>4,803</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/13/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/13/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOHOA SUN SOIL T4N-R65W-S14 L01**

Consent Decree Tank System Number: **2126**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>3,049</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,824</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOHOA SUN SOIL T4N-R65W-S14 L01**

Consent Decree Tank System Number: **2126**

**Audit Notes**

The stem work request (PG 3 of Final Packet pdf) stated to replace the existing 2100 dump valves with 1" 1400 with 1/2" trim however in the job sheets (PG 21 of Final Packet pdf) it is confirmed only the trim was changed to 1/2". The stem engineering evaluation verifies the the dump valve did not change and is still 2".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R63W-S31 L01**

Consent Decree Tank System Number: **501**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R63W-S31 L01_FINAL PACKET	.pdf	9/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R63W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	10/3/2016	STEM Engineering Evaluation Spreadsheet
BOOTH T4N-R63W-S31 L01_SIGNED EVAL	.pdf	10/13/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R63W-S31 L01_FINAL PACKET	.pdf	9/26/2016	Work Request
BOOTH T4N-R63W-S31 L01_FINAL PACKET	.pdf	9/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R63W-S31 L01_FINAL PACKET	.pdf	9/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R63W-S31 L01_IR VERIFICATION	.pdf	9/23/2016	IR Verification Field Data Sheet
BOOTH T4N-R63W-S31 L01_1539_NORMAL	.mp4	9/22/2016	IR Camera Video Normal Operations
BOOTH T4N-R63W-S31 L01_1540_DUMP	.mp4	9/22/2016	IR Camera Video During Dump Event
BOOTH T4N-R63W-S31 L01_1541_POST	.mp4	9/22/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R63W-S31 L01_SIGNED EVAL	.pdf	10/13/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOOTH T4N-R63W-S31 L01**

**Consent Decree Tank System Number:** **501**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,748</b>	<b>12,751</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,788</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>52,304</b>	<b>52,304</b>	
Total VCS Capacity (scfh)	<b>56,092</b>	<b>56,857</b>	
VCS Capacity minus PPIVF (scfh)	<b>43,344</b>	<b>44,106</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury

Audit Document Review Date: 1/2/2018

Audit Document Review Verified by: Craig Bock

Audit Document Verification Date: 8/16/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R63W-S31 L01**

Consent Decree Tank System Number: **501**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	
<b>Total</b>	<b>12,751</b>	<b>12,748</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R63W-S31 L01**

Consent Decree Tank System Number: **501**

**Audit Notes**

Verification of (1) 300 bbl oil tank being bottomed out for headspace was not provided. A request for this verification was submitted.

On 5/16/2018 data was received that confirmed that the tank was bottomed out for headspace.

Field verification for this facility was completed on or around 8/2/2016, field verification confirmed that one tank was bottomed out in order to be used for headspace.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R64W-S25 L01**

Consent Decree Tank System Number: **2307/975**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_FINAL PACKET	.pdf	4/30/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_STEM Engineering Evaluation_rev1	.xlsm	12/2/2016	STEM Engineering Evaluation Spreadsheet
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_SIGNED EVAL	.pdf	12/12/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_FINAL PACKET	.pdf	4/30/2018	Work Request
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_FINAL PACKET	.pdf	4/30/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_WALKDOWN	.pdf	11/30/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_IR VERIFICATION	.pdf	11/28/2016	IR Verification Field Data Sheet
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_1741_NORMAL	.mp4	11/23/2016	IR Camera Video Normal Operations
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_1742_DUMP	.mp4	11/23/2016	IR Camera Video During Dump Event
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_1743_POST	.mp4	11/23/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S25 L01 & PROSPECT T4N-R64W-S26 L03_SIGNED EVAL	.pdf	12/12/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOOTH T4N-R64W-S25 L01**

**Consent Decree Tank System Number:** **2307/975**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,954</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>450</b>	<b>450</b>	
Total VCS Capacity (scfh)	<b>4,404</b>	<b>5,408</b>	
VCS Capacity minus PPIVF (scfh)	<b>960</b>	<b>1,964</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 8/2/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/10/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R64W-S25 L01**

Consent Decree Tank System Number: **2307/975**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R64W-S25 L01**

Consent Decree Tank System Number: **2307/975**

**Audit Notes**

The field data sheets (PG 28 of FINAL PACKET pdf) verify the VOC line from KO to burner to be 3" while the job sheets verify a new 4" line was installed. However the signed eval, and stem engineering evaluation show that line to be 3" and the site was modeled as such. While the documented data is conflicting it is safe to say the site is evaluated correctly and is more conservative using the 3" line in the model as opposed to the 4" line. VCS capacity is acceptable for PPIVFR modeling with 3" and 4" line size. VCS may have been underestimated using the 3".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOOTH T4N-R64W-S26 L01**

**Consent Decree Tank System Number:** **1573/495**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_FINAL PACKET	pdf	1/26/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_SIGNED EVAL	pdf	1/31/2017	Final Signed Engineering Evaluation
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_STEM Engineering Evaluation_rev1	xlsm	N/A	STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_FINAL PACKET	pdf	1/26/2017	Work Request
S26 L01_FINAL PACKET	pdf	1/26/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_WALKDOWN	pdf	1/18/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_0040_NORMAL	mp4	1/18/2017	IR Camera Video Normal Operations
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_0041_DUMP	mp4	1/18/2017	IR Camera Video During Dump Event
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_0042_POST	mp4	1/18/2017	IR Camera Video Post Dump Event
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_IR VERIFICATION	pdf	1/18/2017	IR Verification Field Data Sheet

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01_SIGNED EVAL	pdf	1/31/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R64W-S26 L01**

Consent Decree Tank System Number: **1573/495**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,582</b>	<b>13,584</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>28,441</b>	<b>28,441</b>	
Total VCS Capacity (scfh)	<b>31,993</b>	<b>33,041</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,411</b>	<b>19,457</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 11/6/2017  
 Audit Document Review Verified by: \_\_\_\_\_ K. Malmquist  
 Audit Document Verification Date: \_\_\_\_\_ 12/31/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R64W-S26 L01**

Consent Decree Tank System Number: **1573/495**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.50</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.61</b>							
Gas/Oil Ratio (scf/bbl)	<b>256.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>601</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>153</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1184</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>303.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>11</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>12,639</b>	<b>12,639</b>
Oil Tank Working Rate	<b>469</b>	<b>468</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	
<b>Total</b>	<b>13,584</b>	<b>13,582</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH T4N-R64W-S26 L01**

Consent Decree Tank System Number: **1573/495**

**Audit Notes**

BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01\_WALKDOWN.pdf is not checked as complete. Pg 31 of BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01\_FINAL PACKET.pdf confirms most work in the STEM work request form (pg 5 of BOOTH T4N-R64W-S26 L01 & PROSPECT T4N-R64W-S26 L01\_FINAL PACKET.pdf) was completed. Given documents provided by Noble, SLR is unable to confirm that the 140 psig Sep max operating pressure is currently set onsite. Requested confirmation of pressure setpoint.

**UPDATE FROM NOBLE:** An engineering evaluation was completed on or around 5/10/2018, this review confirmed that the separator pressure is set at 140. The N/A is specific to the LP header, there is no LP header so the N/A seen in the documentation is accurate.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH USX T7N-R65W-S25 L04**

Consent Decree Tank System Number: **1944**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOOTH USX T7N-R65W-S25 L04_FINAL PACKET	.pdf	9/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOOTH USX T7N-R65W-S25 L04_STEM Engineering Evaluation_rev1	.xlsm	1/3/2018	STEM Engineering Evaluation Spreadsheet
BOOTH USX T7N-R65W-S25 L04_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOOTH USX T7N-R65W-S25 L04_FINAL PACKET // BOOTH USX T7N-R65W-S25 L04_COMPLETED TLO	.pdf	9/30/2015 // 5/1/2018	Work Request
BOOTH USX T7N-R65W-S25 L04_FINAL PACKET // BOOTH USX T7N-R65W-S25 L04_COMPLETED TLO	.pdf	9/30/2015 // 5/1/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOOTH USX T7N-R65W-S25 L04_WALKDOWN	.pdf	9/30/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOOTH USX T7N-R65W-S25 L04_IR VERIFICATION	.pdf	9/29/2015	IR Verification Field Data Sheet
BOOTH USX T7N-R65W-S25 L04_0289_NORMAL	.mp4	9/28/2015	IR Camera Video Normal Operations
BOOTH USX T7N-R65W-S25 L04_0290_DUMP	.mp4	9/28/2015	IR Camera Video During Dump Event
BOOTH USX T7N-R65W-S25 L04_0291_POST	.mp4	9/28/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOOTH USX T7N-R65W-S25 L04_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH USX T7N-R65W-S25 L04**

Consent Decree Tank System Number: **1944**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,989</b>	<b>15,991</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,034</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>81,001</b>	<b>81,001</b>	
Total VCS Capacity (scfh)	<b>88,035</b>	<b>90,201</b>	
VCS Capacity minus PPIVF (scfh)	<b>72,046</b>	<b>74,210</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/26/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/9/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH USX T7N-R65W-S25 L04**

Consent Decree Tank System Number: **1944**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

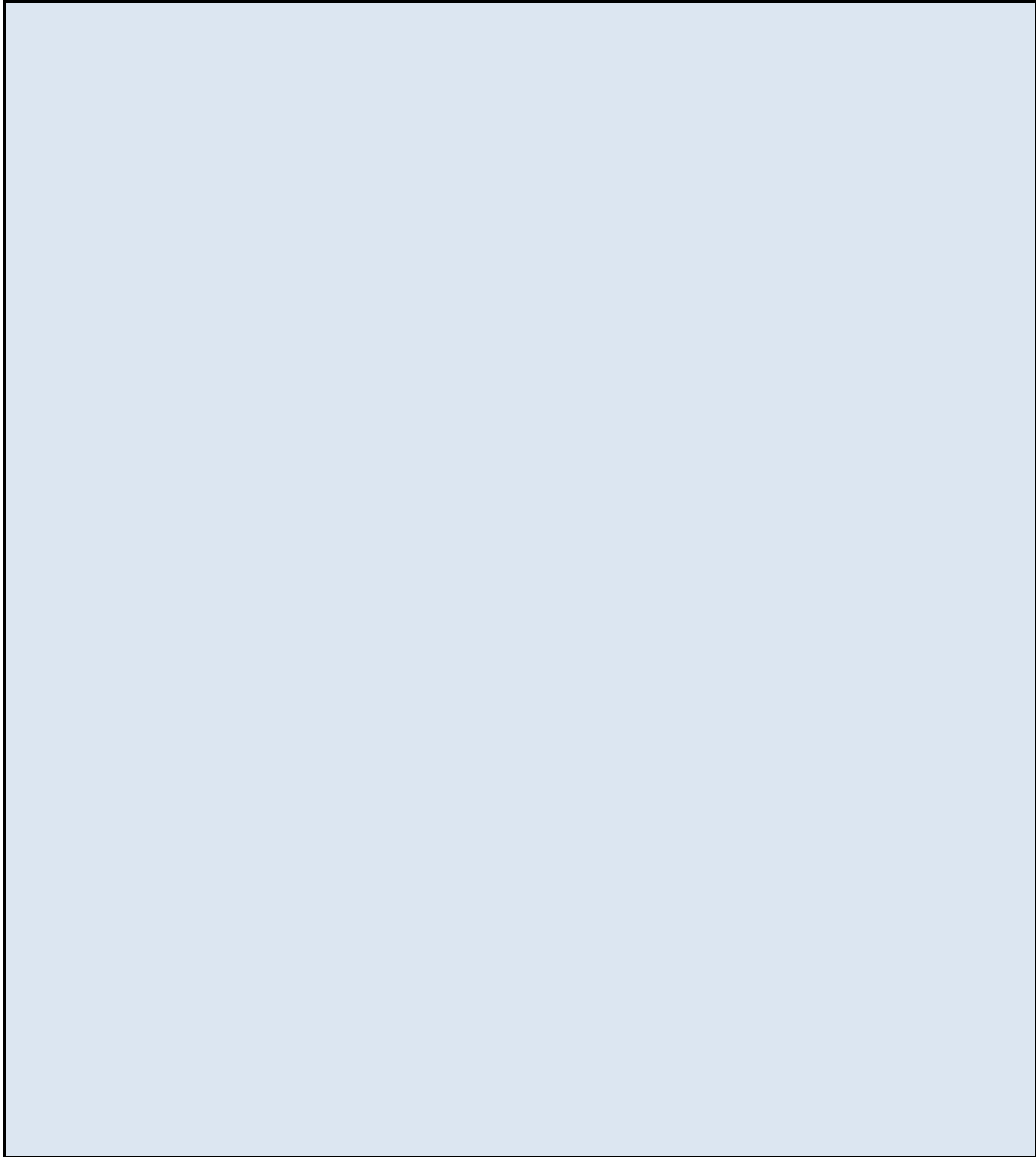
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>15,991</b>	<b>15,989</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOOTH USX T7N-R65W-S25 L04**

Consent Decree Tank System Number: **1944**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BORN SITZMAN FOOS T4N-R64W-S27 L01**

Consent Decree Tank System Number: **486**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BORN SITZMAN FOOS T4N-R64W-S27 L01_FINAL PACKET	.pdf	9/8/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BORN SITZMAN FOOS T4N-R64W-S27 L01_STEM Engineering Evaluation_rev1	.xism	7/12/2017	STEM Engineering Evaluation Spreadsheet
BORN SITZMAN FOOS T4N-R64W-S27 L01_SIGNED EVAL	.pdf	7/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BORN SITZMAN FOOS T4N-R64W-S27 L01_FINAL PACKET	.pdf	9/8/2017	Work Request
BORN SITZMAN FOOS T4N-R64W-S27 L01_FINAL PACKET	.pdf	9/8/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BORN SITZMAN FOOS T4N-R64W-S27 L01_WALKDOWN	.pdf	11/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BORN SITZMAN FOOS T4N-R64W-S27 L01_IR VERIFICATION	.pdf	11/22/2016	IR Verification Field Data Sheet
BORN SITZMAN FOOS T4N-R64W-S27 L01_1738_NORMAL	.mp4	11/22/2016	IR Camera Video Normal Operations
BORN SITZMAN FOOS T4N-R64W-S27 L01_1739_DUMP	.mp4	11/22/2016	IR Camera Video During Dump Event
BORN SITZMAN FOOS T4N-R64W-S27 L01_1740_POST	.mp4	11/22/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BORN SITZMAN FOOS T4N-R64W-S27 L01_SIGNED EVAL	.pdf	7/12/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BORN SITZMAN FOOS T4N-R64W-S27 L01**

Consent Decree Tank System Number: **486**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>25,734</b>	<b>25,739</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,081</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>101,881</b>	<b>101,881</b>	
Total VCS Capacity (scfh)	<b>104,962</b>	<b>106,481</b>	
VCS Capacity minus PPIVF (scfh)	<b>79,228</b>	<b>80,742</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 1/26/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BORN SITZMAN FOOS T4N-R64W-S27 L01**

Consent Decree Tank System Number: **486**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2409	2409						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7						
Working Flow (Mscfd) <sup>h,i</sup>	23	23						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	29	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	22,641	22,641
Oil Tank Working Rate	1,909	1,904
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
<b>Total</b>	<b>25,739</b>	<b>25,734</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BORN SITZMAN FOOS T4N-R64W-S27 L01**

Consent Decree Tank System Number: **486**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 11-16) are not dated. Assumed the date is the same as Facility Scouting date (3/22/2016).

**2. Facility walkdown checklist inconsistencies**

The Signed Walkdown (Final Packet, pg 20) indicates the tanks are banked onsite, the Job Sheet (Final Packet, pg 21) explains there are commingled oil dumps to a common tank header which produces to all liquid service oil tanks onsite. Therefore tanks are not currently banked onsite and the Signed Walkdown checked yes for "Tank Banking" appears to have been an error.

Item C13 of the Walkdown Checklist (Final Packet, pg 7) is checked "yes", indicating all tank fill lines are configured to enable the LP Separator to produce into all tanks. Two oil tanks onsite were converted to vapor surge vessels, see Job Sheet (Final Packet, pg 21, therefore it is not possible for the LP Separators to produce into all tanks onsite.

***Noble Update 8/15/2018 - An engineering review of this facility was completed on or around 7/12/2018, this review confirmed that two tanks were converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).***

**3. Oil dump valve trim size unknown - Request additional information from Noble**

The STEM Work Request (Final Packet, pg 3) requests the oil dump valve trim sizes onsite be confirmed at 1" trim. The only documentation which indicates the oil dump trim size is correct is item A1 on the STEM Walkdown Checklist (Final Packet, pg 5) is checked "yes", however, due to the inconsistencies noted above the checklist is not being used for verification purposes. No other information observed to verify dump valve trim sizes.

**Request additional data from Noble to confirm the oil dump valve trim sizes onsite.**

***Update 8/15/2018 - The Walkdown Checklist confirms the 1" oil dump valve trim onsite.***

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOSCH T5N-R65W-S13 L01**

Consent Decree Tank System Number: **1621**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BOSCH T5N-R65W-S13 L01_FINAL PACKET	.pdf	10/26/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BOSCH T5N-R65W-S13 L01_STEM Engineering Evaluation_rev1	.xlsm	12/20/2016	STEM Engineering Evaluation Spreadsheet
BOSCH T5N-R65W-S13 L01_Final Signed STEM Plan	.pdf	1/24/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BOSCH T5N-R65W-S13 L01_FINAL PACKET	.pdf	10/26/2017	Work Request
BOSCH T5N-R65W-S13 L01_FINAL PACKET	.pdf	10/26/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BOSCH T5N-R65W-S13 L01_WALKDOWN	.pdf	11/14/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BOSCH T5N-R65W-S13 L01_IR VERIFICATION	.pdf	12/7/2016	IR Verification Field Data Sheet
BOSCH T5N-R65W-S13 L01_1772_NORMAL	.mp4	12/5/2016	IR Camera Video Normal Operations
BOSCH T5N-R65W-S13 L01_1773_DUMP	.mp4	12/5/2016	IR Camera Video During Dump Event
BOSCH T5N-R65W-S13 L01_1774_POST	.mp4	12/5/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BOSCH T5N-R65W-S13 L01_SIGNED EVAL	.pdf	1/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOSCH T5N-R65W-S13 L01**

Consent Decree Tank System Number: **1621**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,953</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>600</b>	<b>600</b>	
Total VCS Capacity (scfh)	<b>4,553</b>	<b>5,558</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,109</b>	<b>2,114</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 12/27/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 1/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOSCH T5N-R65W-S13 L01**

Consent Decree Tank System Number: **1621**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	3,445	3,444

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOSCH T5N-R65W-S13 L01**

Consent Decree Tank System Number: **1621**

**Audit Notes**

The walkdown checklist was not marked complete

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER BACON T5N-R65W-S34 L02**

Consent Decree Tank System Number: **2156**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOULTER BACON T5N-R65W-S34 L02_FINAL PACKET	.pdf	Not dated	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOULTER BACON T5N-R65W-S34 L02_STEM Engineering Evaluation_rev1	.xlsm	5/15/2017	STEM Engineering Evaluation Spreadsheet
BOULTER BACON T5N-R65W-S34 L02_SIGNED EVAL	.pdf	5/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOULTER BACON T5N-R65W-S34 L02_FINAL PACKET	.pdf	1/17/2017	Work Request
BOULTER BACON T5N-R65W-S34 L02_FINAL PACKET	.pdf	3/7/2017	Construction Jobsheets
BOULTER BACON T5N-R65W-S34 L02_FINAL PACKET	.pdf	n/a	Site photo with work request instructions

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOULTER BACON T5N-R65W-S34 L02_WALKDOWN	.pdf	4/24/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOULTER BACON T5N-R65W-S34 L02_IR VERIFICATION	.pdf	4/24/2017	IR Verification Field Data Sheet
BOULTER BACON T5N-R65W-S34 L02_1984_NORMAL	.mp4	4/24/2017	IR Camera Video Normal Operations
BOULTER BACON T5N-R65W-S34 L02_1985_DUMP	.mp4	4/24/2017	IR Camera Video During Dump Event
BOULTER BACON T5N-R65W-S34 L02_1986_POST	.mp4	4/24/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOULTER BACON T5N-R65W-S34 L02_SIGNED EVAL	.pdf	5/16/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOULTER BACON T5N-R65W-S34 L02**

**Consent Decree Tank System Number:** **2156**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,441</b>	<b>2,563</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>2,957</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>849</b>	<b>958</b>	
Total VCS Capacity (scfh)	<b>3,806</b>	<b>6,791</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,365</b>	<b>4,229</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Craig Bock  
 Audit Document Review Date: 11/10/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/1/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER BACON T5N-R65W-S34 L02**

Consent Decree Tank System Number: **2156**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>440</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>45.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,913</b>	<b>1,802</b>
Oil Tank Working Rate	<b>174</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,563</b>	<b>2,441</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER BACON T5N-R65W-S34 L02**

Consent Decree Tank System Number: **2156**

**Audit Notes**

Conflicting information on Maximum Operating Pressure of separator:

- >A separator pressure of 65 psig was used in the STEM evaluation.
- >The Job Sheet noted a setting of 55 psig.
- >The QC Stem Checkout sheet noted the PSHH switch was calibrated at 65 psig.

Field data sheet was not dated. Assumed the date is the same as Facility Scouting date (5/6/16).

The Field Data Sheet (Final Packet, Pg 15) indicates The HLP Separator replaces the HP Separator. The HLP has 2" 212 SMA valve. There is no indication on the Job Sheet or in any additional provided documentation the valve body was updated to the 1" 1400.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER FRANK T4N-R65W-S14 L01**

Consent Decree Tank System Number: **2240**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOULTER FRANK T4N-R65W-S14 L01_FINAL PACKET	.pdf	3/17/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOULTER FRANK T4N-R65W-S14 L01_STEM Engineering Evaluation_rev1	.xlsm	12/1/2016	STEM Engineering Evaluation Spreadsheet
BOULTER FRANK T4N-R65W-S14 L01_SIGNED EVAL	.pdf	12/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOULTER FRANK T4N-R65W-S14 L01_FINAL PACKET	.pdf	8/16/2016	Work Request
BOULTER FRANK T4N-R65W-S14 L01_FINAL PACKET	.pdf	10/13/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOULTER FRANK T4N-R65W-S14 L01_WALKDOWN	.pdf	11/17/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOULTER FRANK T4N-R65W-S14 L01_IR VERIFICATION	.pdf	11/16/2016	IR Verification Field Data Sheet
BOULTER FRANK T4N-R65W-S14 L01_1703_NORMAL	.mp4	11/15/2016	IR Camera Video Normal Operations
BOULTER FRANK T4N-R65W-S14 L01_1704_DUMP	.mp4	11/15/2016	IR Camera Video During Dump Event
BOULTER FRANK T4N-R65W-S14 L01_1705_POST	.mp4	11/15/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOULTER FRANK T4N-R65W-S14 L01_SIGNED EVAL	.pdf	12/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOULTER FRANK T4N-R65W-S14 L01**

**Consent Decree Tank System Number:** **2240**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>	<b>65</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,689</b>	<b>7,691</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,926</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>20,092</b>	<b>20,092</b>	
Total VCS Capacity (scfh)	<b>24,018</b>	<b>25,050</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,329</b>	<b>17,360</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 12/22/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 3/30/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER FRANK T4N-R65W-S14 L01**

Consent Decree Tank System Number: **2240**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69	0.69						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.81	0.81						
Gas/Oil Ratio (scf/bbl)	104.5	104.5						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94	0.94						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	535	535						
Vapor Pressure (psia) <sup>c</sup>	78	78						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	760	760						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4	79.4						
Working Flow (Mscfd) <sup>h,i</sup>	7	7						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

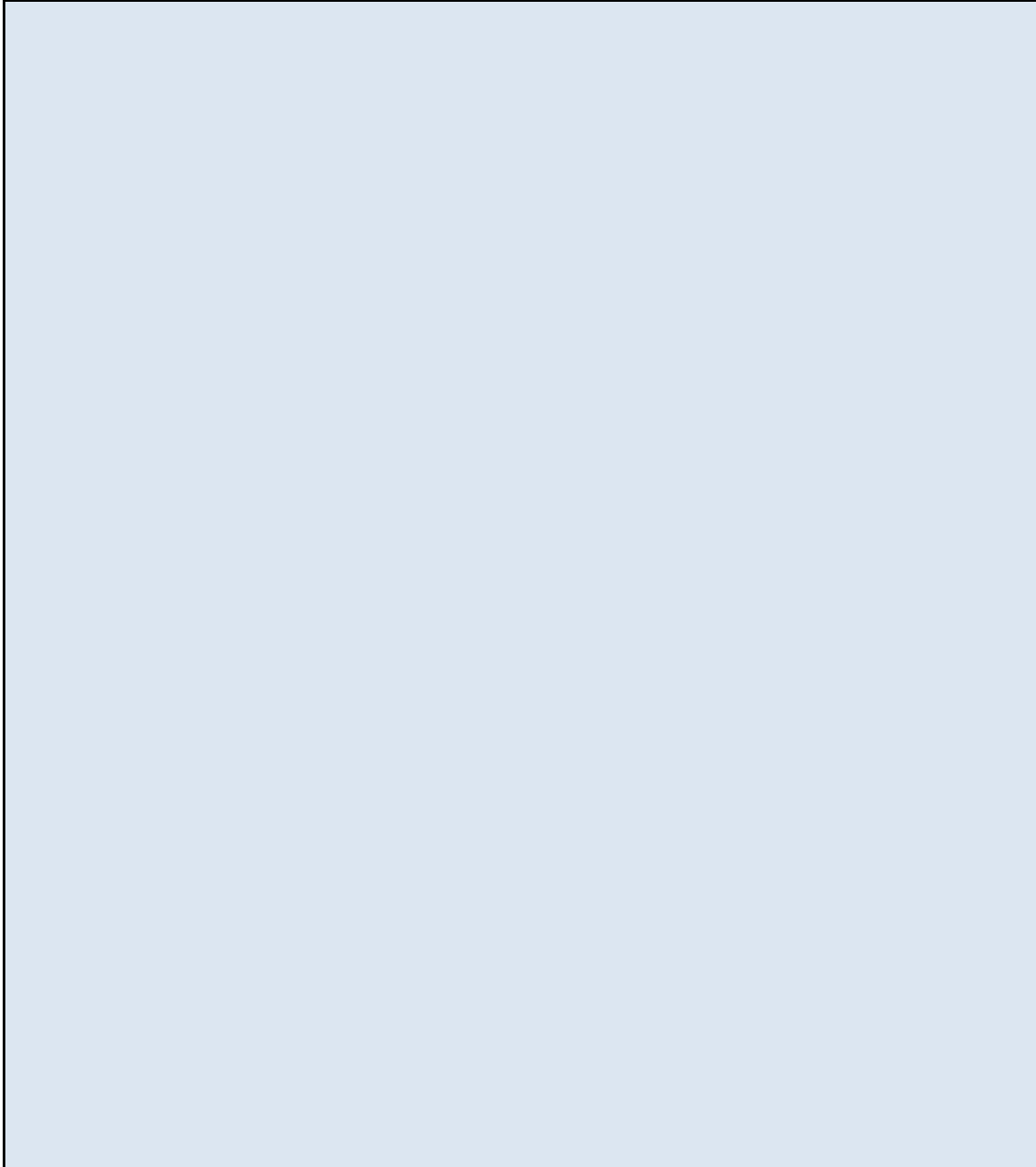
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,613	6,613
Oil Tank Working Rate	602	601
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	7,691	7,689

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER FRANK T4N-R65W-S14 L01**

Consent Decree Tank System Number: **2240**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER ST T4N-R65W-S16 L01**

Consent Decree Tank System Number: **106**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BOULTER ST T4N-R65W-S16 L01_FINAL PACKET	.pdf	4/29/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER ST T4N-R65W-S16 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/20/2017	STEM Engineering Evaluation Spreadsheet
BOULTER ST T4N-R65W-S16 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER ST T4N-R65W-S16 L01_FINAL PACKET	.pdf	4/29/2016	Work Request
BOULTER ST T4N-R65W-S16 L01_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets
102_BOULTER ST T4N-R65W-S16 L01_COMPLETED REWORK	.pdf	8/15/2018	Rework Request

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER ST T4N-R65W-S16 L01_FINAL PACKET	.pdf	4/29/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER ST T4N-R65W-S16 L01_IR VERIFICATION	.pdf	4/29/2016	IR Verification Field Data Sheet
BOULTER ST T4N-R65W-S16 L01_0925_NORMAL	.mp4	4/28/2016	IR Camera Video Normal Operations
BOULTER ST T4N-R65W-S16 L01_0926_DUMP	.mp4	4/28/2016	IR Camera Video During Dump Event
BOULTER ST T4N-R65W-S16 L01_0927_POST	.mp4	4/28/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER ST T4N-R65W-S16 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOULTER ST T4N-R65W-S16 L01**

**Consent Decree Tank System Number:** **106**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>81</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>80</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>28,498</b>	<b>28,503</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,510</b>	<b>9,106</b>	
Headspace Surge Capacity (scfh)	<b>142,293</b>	<b>142,293</b>	
Total VCS Capacity (scfh)	<b>149,803</b>	<b>151,399</b>	
VCS Capacity minus PPIVF (scfh)	<b>121,305</b>	<b>122,896</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 8/23/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/7/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER ST T4N-R65W-S16 L01**

Consent Decree Tank System Number: **106**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2409	2409						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7						
Working Flow (Mscfd) <sup>h,i</sup>	23	23						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	34	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	22,641	22,641
Oil Tank Working Rate	1,909	1,904
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	2,527	2,527
Total	28,503	28,498

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER ST T4N-R65W-S16 L01**

Consent Decree Tank System Number: **106**

**Audit Notes**

The Job Sheet and Work Request indicate a single tank is to be removed from storage service and used as a vapor headspace. This should be a 75% tank full level. The evaluation was completed with a 60% tank full level, indicating two (2) tanks are being used as vapor headspace. Confirmation needed on how many tanks are in headspace service only.

NEI response to data request regarding number of headspace tanks. Data provided 8/14/2018:  
Rework was completed for this facility on or about 6/27/16 that converted an additional oil tank into a headspace tank, the completed rework packet is provided in this 3rd Information Request Response titled 102\_BOULTER ST T4N-R65W-S16 L01\_COMPLETED REWORK.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S11 L03**

Consent Decree Tank System Number: **251**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S11 L03_FINAL PACKET	.pdf	10/10/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S11 L03_STEM Engineering Evaluation_rev1	.xlsm	10/12/2016	STEM Engineering Evaluation Spreadsheet
BOULTER T4N-R65W-S11 L03_SIGNED EVAL	.pdf	10/17/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S11 L03_FINAL PACKET	.pdf	10/10/2016	Work Request
BOULTER T4N-R65W-S11 L03_FINAL PACKET	.pdf	10/10/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S11 L03_FINAL PACKET	.pdf	10/10/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S11 L03_IR VERIFICATION	.pdf	10/5/2016	IR Verification Field Data Sheet
BOULTER T4N-R65W-S11 L03_1566_NORMAL	.mp4	10/3/2016	IR Camera Video Normal Operations
BOULTER T4N-R65W-S11 L03_1567_DUMP	.mp4	10/3/2016	IR Camera Video During Dump Event
BOULTER T4N-R65W-S11 L03_1568_POST	.mp4	10/3/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S11 L03_SIGNED EVAL	.pdf	10/17/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S11 L03**

Consent Decree Tank System Number: **251**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>300</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>18,983</b>	<b>18,986</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>59,031</b>	<b>72,793</b>	
Total VCS Capacity (scfh)	<b>61,947</b>	<b>78,626</b>	
VCS Capacity minus PPIVF (scfh)	<b>42,964</b>	<b>59,641</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 1/2/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/17/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S11 L03**

Consent Decree Tank System Number: **251**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77							
Valve Coefficient (gpm/psi) (C)	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77	0.77						
Valve Coefficient (gpm/psi) (C)	21.25	21.25						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	9903	5068						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	40	20						
Working Flow (Mscfd) <sup>l</sup>	56	28						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	2,495	2,495
Water Tank Working Rate	3,502	3,502
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	18,986	18,983

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S11 L03**

Consent Decree Tank System Number: 251

**Audit Notes**

The STEM Work Request Form, Field Data Sheets and Job Sheets do not indicate that the water tanks are controlled with the VCS. However, Noble's STEM Engineering Evaluation includes HP (300#) and LP (70#) water dumps. No water tanks are included in the evaluation. There are three 60 bbl water tanks (pg. 23 & 25). From the documentation, the water dump valves shouldn't be included. This is a discrepancy that over estimates volume of generated vapor.

The vapor headspace percentage considered in the Noble model was not correct. The value entered was 68%. It should have been 60%. Again this is a conservative correction that provides more headspace than considered in the original evaluation.

The Noble work on this evaluation was inconsistent and did not follow their published guidelines, however considering the available documentation, it is SLR's opinion that the VCS is adequately designed. No additional information is needed for this facility.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S14 L01**

Consent Decree Tank System Number: **141**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L02_FINAL PACKET	.pdf	1/24/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
BOULTER T4N-R65W-S14 L02_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L02_FINAL PACKET	.pdf	1/24/2017	Work Request
BOULTER T4N-R65W-S14 L02_FINAL PACKET	.pdf	1/24/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L02_WALKDOWN	.pdf	1/20/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L02_IR VERIFICATION	.pdf	1/20/2017	IR Verification Field Data Sheet
BOULTER T4N-R65W-S14 L02_1279_NORMAL	.mp4	1/20/2017	IR Camera Video Normal Operations
BOULTER T4N-R65W-S14 L02_1280_DUMP	.mp4	1/20/2017	IR Camera Video During Dump Event
BOULTER T4N-R65W-S14 L02_1281_POST	.mp4	1/20/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L02_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOULTER T4N-R65W-S14 L01**

**Consent Decree Tank System Number:** **141**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,787</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>2,475</b>	<b>2,475</b>	
Total VCS Capacity (scfh)	<b>6,262</b>	<b>7,028</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,180</b>	<b>2,945</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/20/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S14 L01**

Consent Decree Tank System Number: **141**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

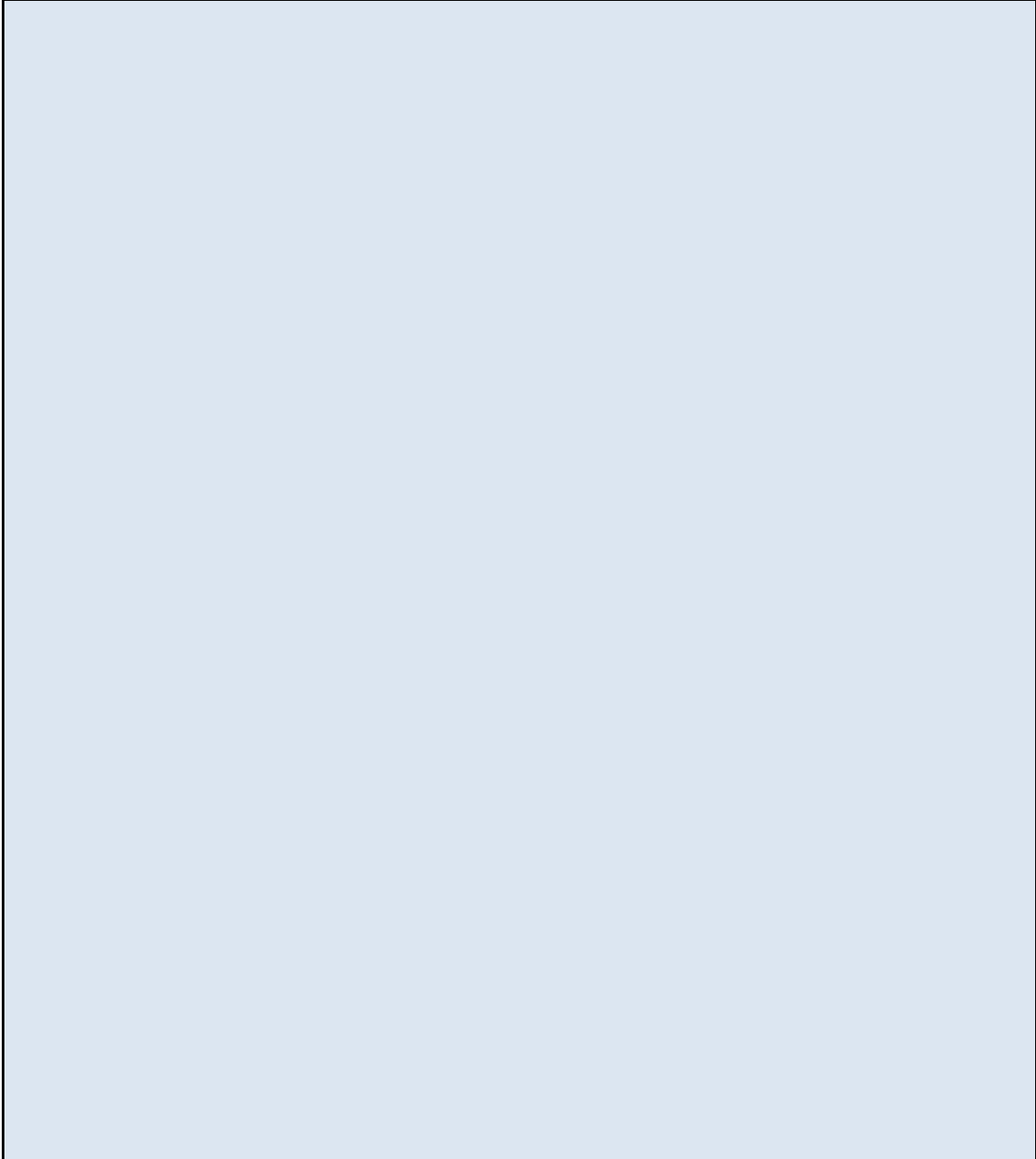
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S14 L01**

Consent Decree Tank System Number: **141**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOULTER T4N-R65W-S14 L03**

**Consent Decree Tank System Number:** **142**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L03_FINAL PACKET	.pdf	4/13/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L03_STEM Engineering Evaluation_rev1	.xlsm	4/6/2016	STEM Engineering Evaluation Spreadsheet
BOULTER T4N-R65W-S14 L03_SIGNED EVAL	.pdf	4/13/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L03_FINAL PACKET	.pdf	4/13/2016	Work Request
BOULTER T4N-R65W-S14 L03_FINAL PACKET	.pdf	4/13/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L03_WALKDOWN	.pdf	4/13/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L03_IR VERIFICATION	.pdf	4/5/2016	IR Verification Field Data Sheet
BOULTER T4N-R65W-S14 L03_0818_NORMAL	.mp4	4/4/2016	IR Camera Video Normal Operations
BOULTER T4N-R65W-S14 L03_0819_DUMP	.mp4	4/4/2016	IR Camera Video During Dump Event
BOULTER T4N-R65W-S14 L03_0820_POST	.mp4	4/4/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S14 L03_SIGNED EVAL	.pdf	4/13/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S14 L03**

Consent Decree Tank System Number: **142**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,747</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>15,013</b>	<b>23,295</b>	
Total VCS Capacity (scfh)	<b>17,940</b>	<b>29,128</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,432</b>	<b>24,381</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper

Audit Document Review Date: 7/30/2018

Audit Document Review Verified by: Angela M. Oberlander

Audit Document Verification Date: 10/7/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S14 L03**

Consent Decree Tank System Number: **142**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S14 L03**

Consent Decree Tank System Number: 142

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

NEIs response to a follow up data request regarding the headspace tank is below. Data received 5/16/2018: Field verification for this facility was completed on or around 3/2/2016, field verification confirmed that one tank was disconnected from the fill header in order to be used as headspace.

The NEI Engineering Evaluation was completed with 2 tanks instead of 3. The Signed Engineering Evaluation Summary was hard typed over with 3 on the No. of Tanks field, while the calculations page indicated it was 2 at 60%. This impacts the breathing losses resulting in a lower estimated PPIVFR. The Modeling Guidelines can not be confirmed as strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOULTER T4N-R65W-S21 L01**

**Consent Decree Tank System Number:** **155**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S21 L01_FINAL PACKET	.pdf	11/15/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	12/1/2016	STEM Engineering Evaluation Spreadsheet
BOULTER T4N-R65W-S21 L01_SIGNED EVAL	.pdf	12/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S21 L01_FINAL PACKET	.pdf	11/15/2016	Work Request
BOULTER T4N-R65W-S21 L01_FINAL PACKET	.pdf	11/15/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S21 L01_WALKDOWN	.pdf	11/28/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S21 L01_IR VERIFICATION	.pdf	11/15/2016	IR Verification Field Data Sheet
BOULTER T4N-R65W-S21 L01_1700_NORMAL	.mp4	11/14/2016	IR Camera Video Normal Operations
BOULTER T4N-R65W-S21 L01_1701_DUMP	.mp4	11/14/2016	IR Camera Video During Dump Event
BOULTER T4N-R65W-S21 L01_1702_POST	.mp4	11/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BOULTER T4N-R65W-S21 L01_SIGNED EVAL	.pdf	12/5/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BOULTER T4N-R65W-S21 L01**

**Consent Decree Tank System Number:** **155**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>	<b>55</b>	<b>55</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>	<b>LEED EC48-2S</b>	<b>LEED 48" Gen 1 #7</b>	
Number of Units	<b>1</b>	<b>1</b>	<b>1</b>	
Man. Capacity (MSCFD)	<b>119</b>	<b>119</b>	<b>140</b>	

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,205</b>	<b>9,584</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>9,026</b>	<b>15,750</b>	
Headspace Surge Capacity (scfh)	<b>2,579</b>	<b>2,880</b>	
Total VCS Capacity (scfh)	<b>11,605</b>	<b>18,630</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,400</b>	<b>9,046</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 1/3/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/8/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S21 L01**

Consent Decree Tank System Number: **155**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51	0.51	0.51					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	0.62	0.62	0.62					
Gas/Oil Ratio (scf/bbl)	88.4	88.4	88.4					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78	0.78	0.78					
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20	7.20	7.20					
Critical Pressure (psia) <sup>b</sup>	526	526	526					
Vapor Pressure (psia) <sup>c</sup>	68	68	68					
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.86	0.86	0.86					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	725	725	725					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	64.1	64.1	64.1					
Working Flow (Mscfd) <sup>h,i</sup>	7	7	7					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	8,010	7,669
Oil Tank Working Rate	861	823
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	9,584	9,205

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BOULTER T4N-R65W-S21 L01**

Consent Decree Tank System Number: **155**

**Audit Notes**

No confirmation of the oil dump valve size for the new LP separators or for the existing HLP which had a Kimray 212 SMA. Since Item A1 in the walkdown sheet was checked "Yes", the model was updated and run with 2" valves with the confirmed 1/2" trims. It is unknown if the Modeling Guidelines were followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRONCO ST T5N-R62W-S10 L01**

Consent Decree Tank System Number: **2045**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
BRONCO ST T5N-R62W-S10 L01_FINAL PACKET	PDF	8/25/2016	Field Datasheets

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
BRONCO ST T5N-R62W-S10 L01_SIGNED EVAL	PDF	7/17/2017	Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
BRONCO ST T5N-R62W-S10 L01_FINAL PACKET	PDF	2/3/2016	STEM Work Request Form
BRONCO ST T5N-R62W-S10 L01_FINAL PACKET	PDF	7/20/2016	Job Sheet

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
BRONCO ST T5N-R62W-S10 L01_WALKDOWN	PDF	8/23/2016	Final Walkdown

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
BRONCO ST T5N-R62W-S10 L01_IR VERIFICATION	PDF	8/23/2016	IR Camera Verification Document
BRONCO ST T5N-R62W-S10 L01_1423_NORMAL	MP4	8/23/2016	IR Verification Video Normal
BRONCO ST T5N-R62W-S10 L01_1424_DUMP	MP4	8/23/2016	IR Verification Video Dump
BRONCO ST T5N-R62W-S10 L01_1425_POST	MP4	8/23/2016	IR Verification Video Post

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
BRONCO ST T5N-R62W-S10 L01_SIGNED EVAL	PDF	7/17/2017	Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRONCO ST T5N-R62W-S10 L01**

Consent Decree Tank System Number: **2045**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,615</b>	<b>7,616</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,893</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>29,990</b>	<b>29,990</b>	
Total VCS Capacity (scfh)	<b>32,883</b>	<b>35,823</b>	
VCS Capacity minus PPIVF (scfh)	<b>25,268</b>	<b>28,208</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/17/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRONCO ST T5N-R62W-S10 L01**

Consent Decree Tank System Number: **2045**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>	<b>0.94</b>						
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>	<b>5.72</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>No</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>3740</b>	<b>1641</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>15</b>	<b>7</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>21</b>	<b>9</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>897</b>	<b>897</b>
Water Tank Working Rate	<b>1,259</b>	<b>1,259</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>2,527</b>	
Total	<b>7,616</b>	<b>7,615</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRONCO ST T5N-R62W-S10 L01**

Consent Decree Tank System Number: **2045**

**Audit Notes**

All information and documentation is complete. No need for further information or evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRUNTZ BOULTER T4N-R65W-S16 L01**

Consent Decree Tank System Number: **825**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L01_FINAL PACKET	.pdf	12/27/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L01_STEM Engineering Evaluation_rev1	.xlsm	1/17/2017	STEM Engineering Evaluation Spreadsheet
BRUNTZ BOULTER T4N-R65W-S16 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L01_FINAL PACKET	.pdf	12/27/2016	Work Request
BRUNTZ BOULTER T4N-R65W-S16 L01_FINAL PACKET	.pdf	12/27/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L01_WALKDOWN	.pdf	12/27/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L01_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
BRUNTZ BOULTER T4N-R65W-S16 L01_1821_NORMAL	.mp4	12/21/2016	IR Camera Video Normal Operations
BRUNTZ BOULTER T4N-R65W-S16 L01_1822_DUMP	.mp4	12/21/2016	IR Camera Video During Dump Event
BRUNTZ BOULTER T4N-R65W-S16 L01_1823_POST	.mp4	12/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BRUNTZ BOULTER T4N-R65W-S16 L01**

**Consent Decree Tank System Number:** **825**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,327</b>	<b>2,327</b>	
Total VCS Capacity (scfh)	<b>5,879</b>	<b>6,927</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,198</b>	<b>3,244</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/18/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRUNTZ BOULTER T4N-R65W-S16 L01**

Consent Decree Tank System Number: **825**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

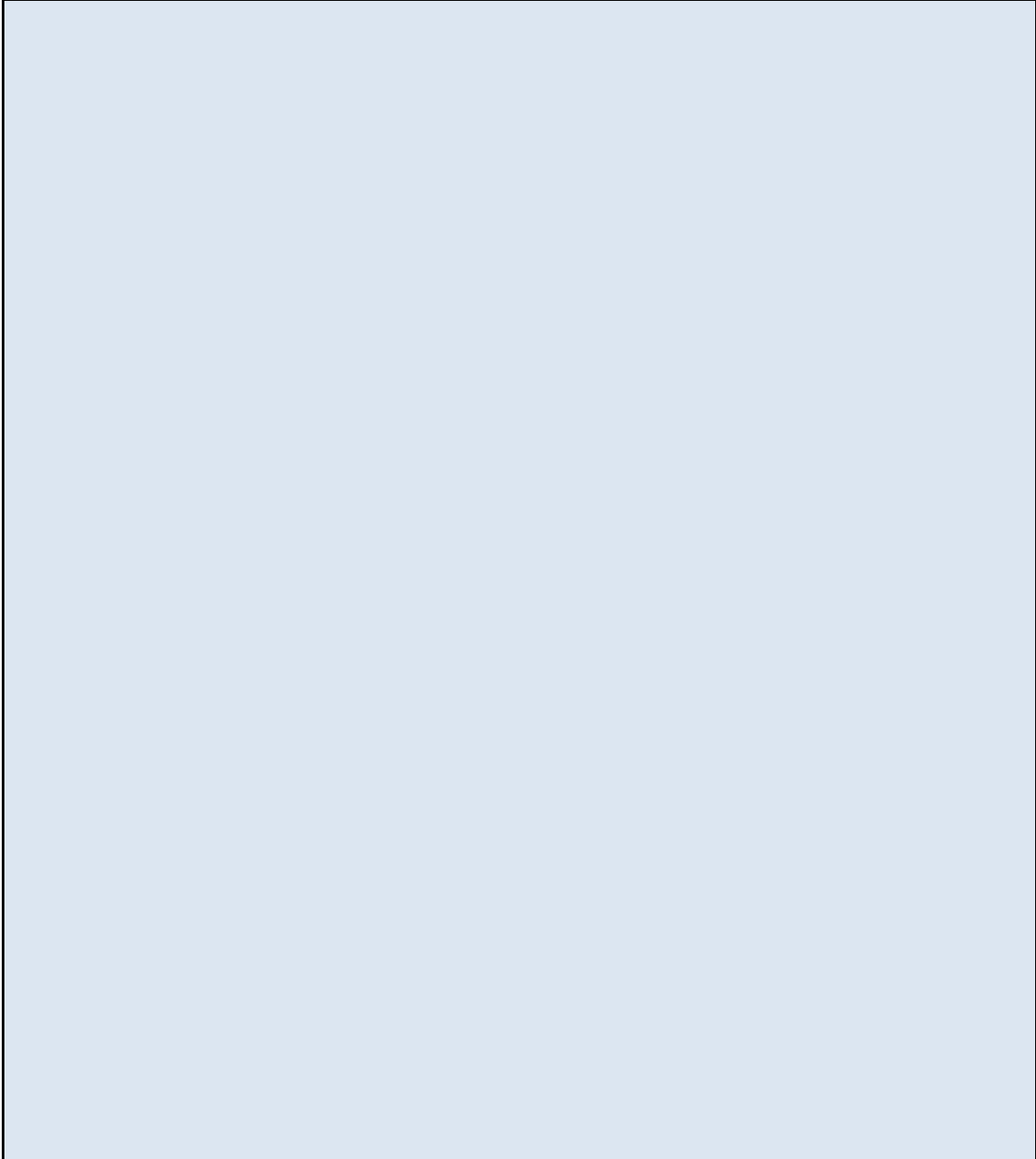
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRUNTZ BOULTER T4N-R65W-S16 L01**

Consent Decree Tank System Number: **825**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRUNTZ BOULTER T4N-R65W-S16 L02**

Consent Decree Tank System Number: **145**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L02_FINAL PACKET	.pdf	5/18/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L02_STEM Engineering Evaluation_rev1	.xlsm	11/8/2016	STEM Engineering Evaluation Spreadsheet
BRUNTZ BOULTER T4N-R65W-S16 L02_SIGNED EVAL	.pdf	11/21/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L02_FINAL PACKET	.pdf	5/18/2018	Work Request
BRUNTZ BOULTER T4N-R65W-S16 L02_FINAL PACKET	.pdf	5/18/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L02_WALKDOWN	.pdf	11/8/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L02_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
BRUNTZ BOULTER T4N-R65W-S16 L02_1026_NORMAL	.mp4	10/31/2016	IR Camera Video Normal Operations
BRUNTZ BOULTER T4N-R65W-S16 L02_1027_DUMP	.mp4	10/31/2016	IR Camera Video During Dump Event
BRUNTZ BOULTER T4N-R65W-S16 L02_1028_POST	.mp4	10/31/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BRUNTZ BOULTER T4N-R65W-S16 L02_SIGNED EVAL	.pdf	11/21/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BRUNTZ BOULTER T4N-R65W-S16 L02**

**Consent Decree Tank System Number:** **145**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,957</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,303</b>	<b>21,303</b>	
Total VCS Capacity (scfh)	<b>24,260</b>	<b>27,136</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,752</b>	<b>22,627</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/11/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRUNTZ BOULTER T4N-R65W-S16 L02**

Consent Decree Tank System Number: **145**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

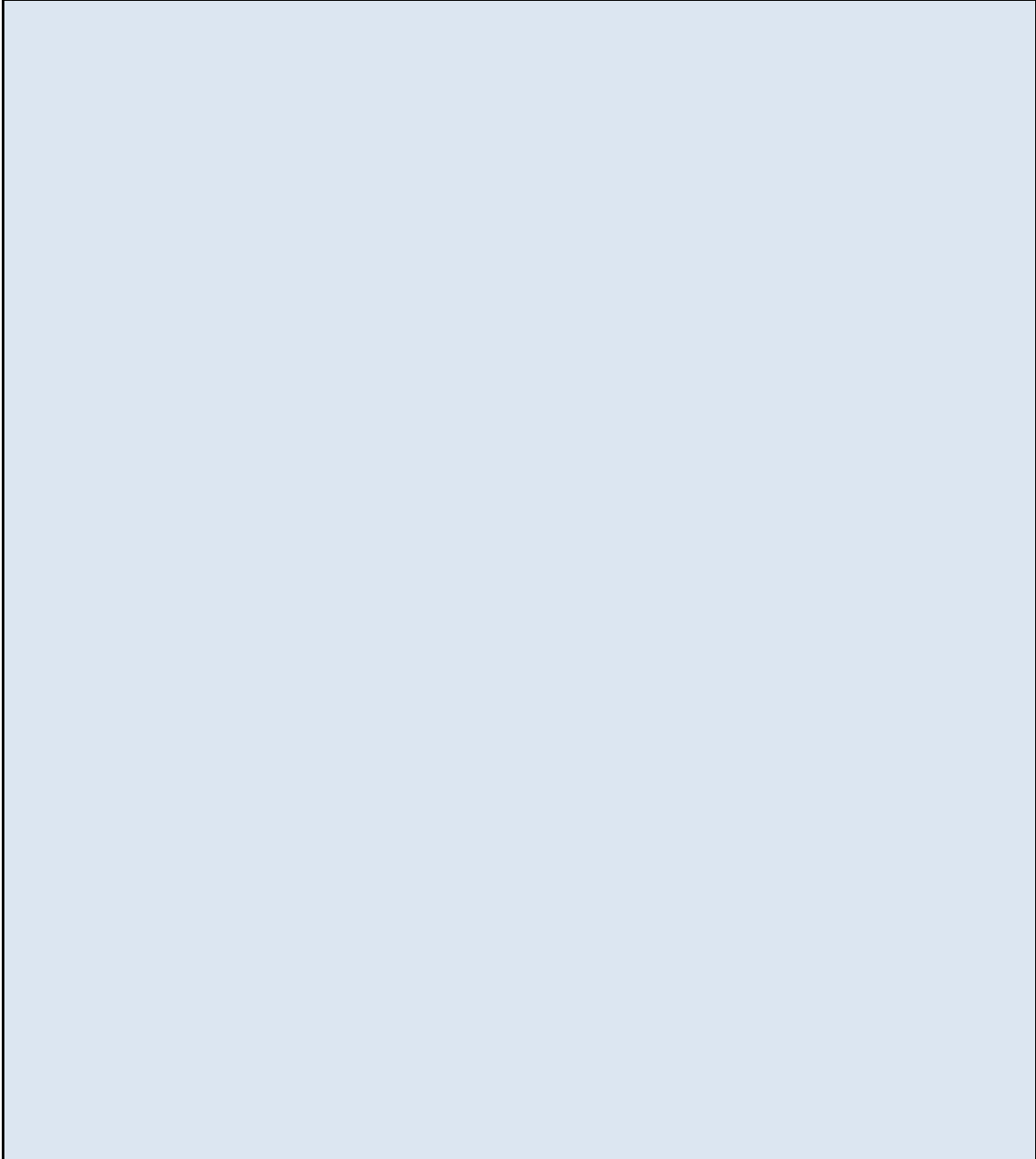
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BRUNTZ BOULTER T4N-R65W-S16 L02**

Consent Decree Tank System Number: **145**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BULLEIT FED T8N-R59W-S4 L01**

Consent Decree Tank System Number: **2371**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BULLEIT FED T8N-R59W-S4 L01_FINAL PACKET	.pdf	7/22/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BULLEIT FED T8N-R59W-S4 L01_STEM Engineering Evaluation_rev1	.xlsm	6/29/2017	STEM Engineering Evaluation Spreadsheet
BULLEIT FED T8N-R59W-S4 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BULLEIT FED T8N-R59W-S4 L01_FINAL PACKET	.pdf	7/29/2015	Work Request
BULLEIT FED T8N-R59W-S4 L01_FINAL PACKET	.pdf	10/1/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BULLEIT FED T8N-R59W-S4 L01_WALKDOWN	.pdf	10/30/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BULLEIT FED T8N-R59W-S4 L01_IR VERIFICATION	.pdf	10/28/2015	IR Verification Field Data Sheet
BULLEIT FED T8N-R59W-S4 L01_0392_NORMAL	.mp4	10/27/2015	IR Camera Video Normal Operations
BULLEIT FED T8N-R59W-S4 L01_0393_DUMP	.mp4	10/27/2015	IR Camera Video During Dump Event
BULLEIT FED T8N-R59W-S4 L01_0394_POST	.mp4	10/27/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BULLEIT FED T8N-R59W-S4 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BULLEIT FED T8N-R59W-S4 L01**

**Consent Decree Tank System Number:** **2371**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>500</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>23,339</b>	<b>23,342</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,247</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>35,721</b>	<b>35,721</b>	
Total VCS Capacity (scfh)	<b>40,968</b>	<b>47,388</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,629</b>	<b>24,046</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 12/22/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 3/30/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BULLEIT FED T8N-R59W-S4 L01**

Consent Decree Tank System Number: **2371**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>12689</b>	<b>5068</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>51</b>	<b>20</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>71</b>	<b>28</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>2,959</b>	<b>2,959</b>
Water Tank Working Rate	<b>4,154</b>	<b>4,154</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>23,342</b>	<b>23,339</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BULLEIT FED T8N-R59W-S4 L01**

Consent Decree Tank System Number: 2371

**Audit Notes**

The IR Camera Inspections were performed 10/27/2015, 3 months prior to the QC of the PSHH at this site (BULLEIT FED T8N-R59W-S4 L01\_FINAL PACKET.pdf, page 24) and 2 years prior to the Signed Evaluation. For this reason this site has been selected for IR camera Inspection.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BUNTING T5N-R65W-S35 L01**

Consent Decree Tank System Number: **2282**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BUNTING T5N-R65W-S35 L01_FINAL PACKET	.pdf	7/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BUNTING T5N-R65W-S35 L01_STEM Engineering Evaluation_rev1	.xlsm	7/22/2016	STEM Engineering Evaluation Spreadsheet
BUNTING T5N-R65W-S35 L01_SIGNED EVAL	.pdf	7/26/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BUNTING T5N-R65W-S35 L01_FINAL PACKET	.pdf	7/11/2016	Work Request
BUNTING T5N-R65W-S35 L01_FINAL PACKET	.pdf	7/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BUNTING T5N-R65W-S35 L01_WALKDOWN	.pdf	7/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BUNTING T5N-R65W-S35 L01_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
BUNTING T5N-R65W-S35 L01_1253_NORMAL	.mp4	7/7/2016	IR Camera Video Normal Operations
BUNTING T5N-R65W-S35 L01_1254_DUMP	.mp4	7/7/2016	IR Camera Video During Dump Event
BUNTING T5N-R65W-S35 L01_1255_POST	.mp4	7/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BUNTING T5N-R65W-S35 L01_SIGNED EVAL	.pdf	7/26/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BUNTING T5N-R65W-S35 L01**

**Consent Decree Tank System Number:** **2282**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,878</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>710</b>	<b>710</b>	
Total VCS Capacity (scfh)	<b>4,588</b>	<b>5,263</b>	
VCS Capacity minus PPIVF (scfh)	<b>743</b>	<b>1,418</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/13/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/13/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BUNTING T5N-R65W-S35 L01**

Consent Decree Tank System Number: **2282**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

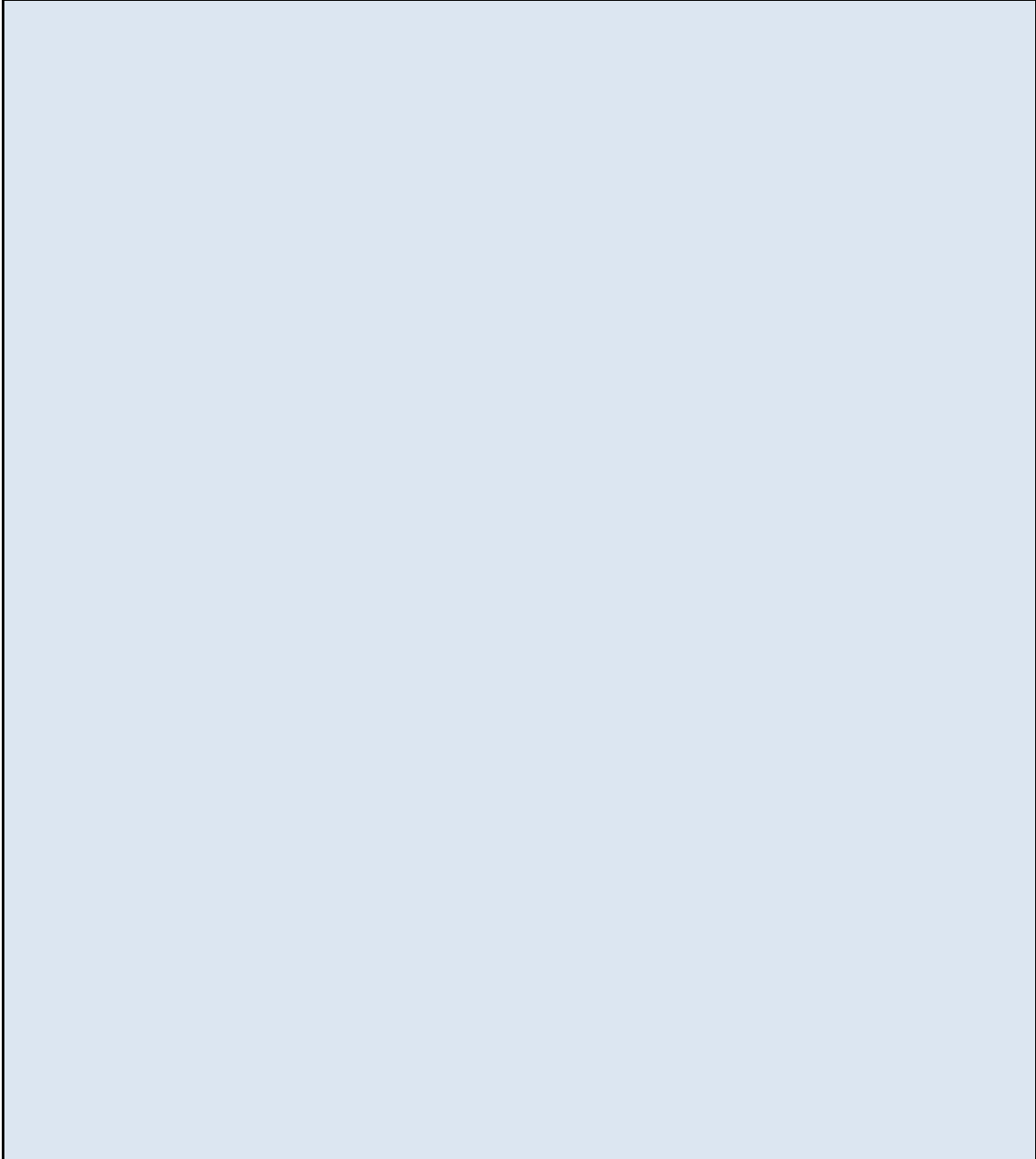
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,845</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BUNTING T5N-R65W-S35 L01**

Consent Decree Tank System Number: **2282**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BURMAN T4N-R64W-S5 L01**

Consent Decree Tank System Number: **621**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BURMAN T4N-R64W-S5 L01_FINAL PACKET	.pdf	1/2/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BURMAN T4N-R64W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	1/2/2018	STEM Engineering Evaluation Spreadsheet
BURMAN T4N-R64W-S5 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BURMAN T4N-R64W-S5 L01_FINAL PACKET	.pdf	1/2/2018	Work Request
BURMAN T4N-R64W-S5 L01_FINAL PACKET	.pdf	1/2/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BURMAN T4N-R64W-S5 L01_WALKDOWN	.pdf	1/2/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BURMAN T4N-R64W-S5 L01_IR VERIFICATION	.pdf	12/27/2017	IR Verification Field Data Sheet
BURMAN T4N-R64W-S5 L01_0052_NORMAL	.mp4	12/20/2017	IR Camera Video Normal Operations
BURMAN T4N-R64W-S5 L01_0053_DUMP	.mp4	12/20/2017	IR Camera Video During Dump Event
BURMAN T4N-R64W-S5 L01_0054_POST	.mp4	12/20/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BURMAN T4N-R64W-S5 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **BURMAN T4N-R64W-S5 L01**

**Consent Decree Tank System Number:** **621**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,384</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>3,782</b>	<b>3,782</b>	
Total VCS Capacity (scfh)	<b>9,166</b>	<b>15,449</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,420</b>	<b>10,702</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/13/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/13/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BURMAN T4N-R64W-S5 L01**

Consent Decree Tank System Number: **621**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

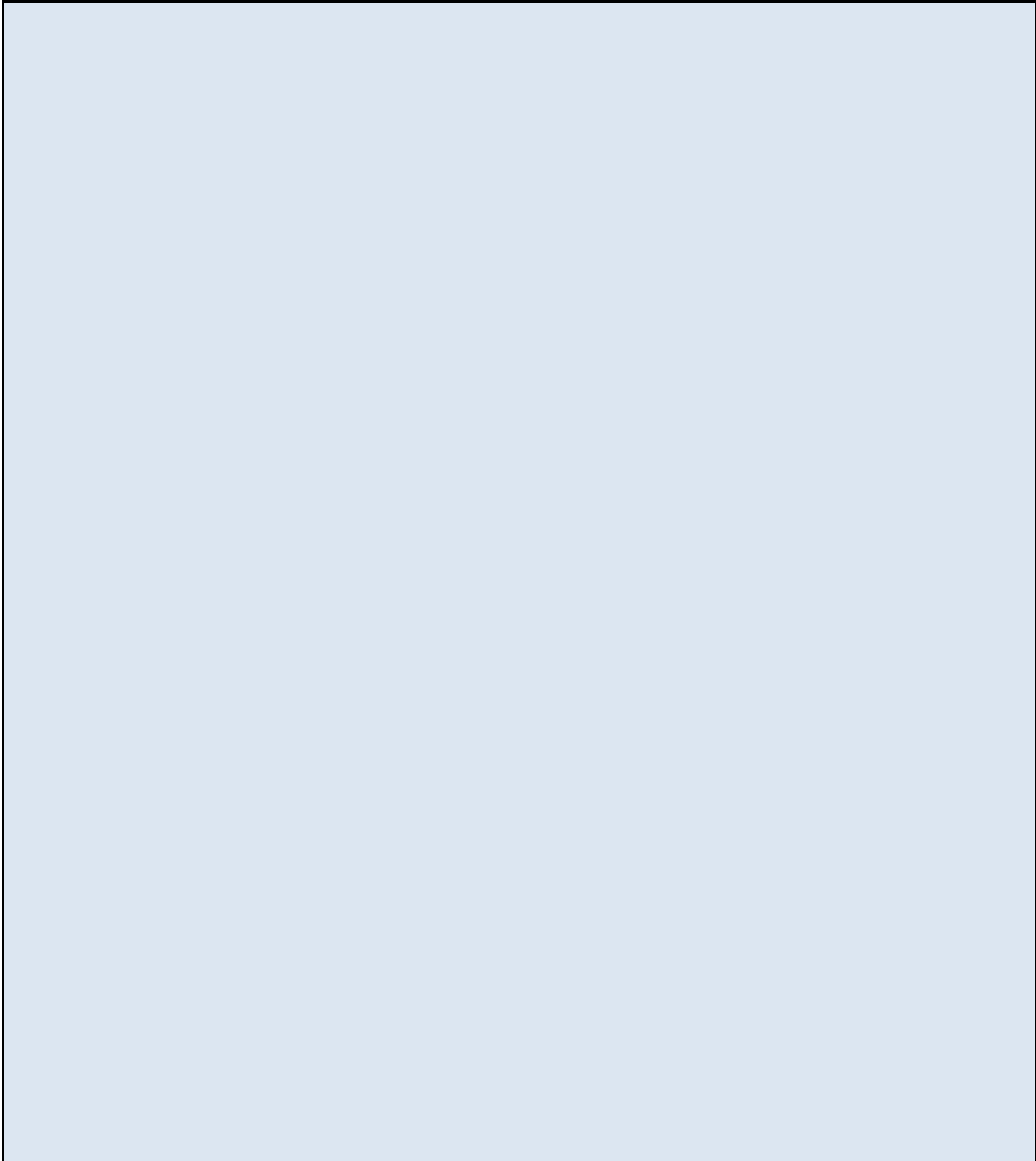
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BURMAN T4N-R64W-S5 L01**

Consent Decree Tank System Number: **621**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BUTTERBALL MILE HI T3N-R64W-S19 L01**

Consent Decree Tank System Number: **403**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BUTTERBALL MILE HI T3N-R64W-S19 L01_FINAL PACKET	.pdf	8/30/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL MILE HI T3N-R64W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	9/1/2016	STEM Engineering Evaluation Spreadsheet
BUTTERBALL MILE HI T3N-R64W-S19 L01_SIGNED EVAL	.pdf	9/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL MILE HI T3N-R64W-S19 L01_FINAL PACKET	.pdf	8/30/2016	Work Request
BUTTERBALL MILE HI T3N-R64W-S19 L01_FINAL PACKET	.pdf	8/30/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL MILE HI T3N-R64W-S19 L01_FINAL PACKET	.pdf	8/30/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL MILE HI T3N-R64W-S19 L01_FINAL PACKET	.pdf	8/30/2016	IR Verification Field Data Sheet
BUTTERBALL MILE HI T3N-R64W-S19 L01_1428_NORMAL	.mp4	8/24/2016	IR Camera Video Normal Operations
BUTTERBALL MILE HI T3N-R64W-S19 L01_1429_DUMP	.mp4	8/24/2016	IR Camera Video During Dump Event
BUTTERBALL MILE HI T3N-R64W-S19 L01_1430_POST	.mp4	8/24/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL MILE HI T3N-R64W-S19 L01_SIGNED EVAL	.pdf	9/6/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BUTTERBALL MILE HI T3N-R64W-S19 L01**

Consent Decree Tank System Number: **403**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,229</b>	<b>21,229</b>	
Total VCS Capacity (scfh)	<b>24,156</b>	<b>27,062</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,648</b>	<b>22,374</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Driscoll  
 Audit Document Review Date: 11/10/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BUTTERBALL MILE HI T3N-R64W-S19 L01**

Consent Decree Tank System Number: **403**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C)	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: BUTTERBALL MILE HI T3N-R64W-S19 L01

Consent Decree Tank System Number: 403

**Audit Notes**

Per the Work Request (BUTTERBALL MILE HI T3N-R64W-S19 L01\_FINAL PACKET.pdf, pg. 3) the dump valves on the HLP separator were to be replaced with a 1" valve with 1/2" trim. The Job Sheet (BUTTERBALL MILE HI T3N-R64W-S19 L01\_FINAL PACKET.pdf, pg 35) does not include a reference to replacement of the dump valves or trim. The Final Walkdown (BUTTERBALL MILE HI T3N-R64W-S19 L01\_WALKDOWN.pdf, pg 1) indicates the trim has been verified, but no documentation on the actual valve size is included. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** BUTTERBALL T3N-R64W-S19 L01

**Consent Decree Tank System Number:** 1945

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
BUTTERBALL T3N-R64W-S19 L01_FINAL PACKET	.pdf	5/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL T3N-R64W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	7/13/2017	STEM Engineering Evaluation Spreadsheet
BUTTERBALL T3N-R64W-S19 L01_Final Signed STEM Plan_REV 1	.pdf	10/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL T3N-R64W-S19 L01_FINAL PACKET	.pdf	5/24/2016	Work Request
BUTTERBALL T3N-R64W-S19 L01_FINAL PACKET	.pdf	5/24/2016	Construction Jobsheets
103_BUTTERBALL T3N-R64W-S19 L01 TLO Final Packet	.PDF	8/15/2018	3rd Information Request Response

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL T3N-R64W-S19 L01_WALKDOWN	.pdf	5/24/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL T3N-R64W-S19 L01_IR VERIFICATION	.pdf	5/24/2016	IR Verification Field Data Sheet
BUTTERBALL T3N-R64W-S19 L01_1071_NORMAL	.mp4	5/23/2016	IR Camera Video Normal Operations
BUTTERBALL T3N-R64W-S19 L01_1072_DUMP	.mp4	5/23/2016	IR Camera Video During Dump Event
BUTTERBALL T3N-R64W-S19 L01_1073_POST	.mp4	5/23/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
BUTTERBALL T3N-R64W-S19 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** BUTTERBALL T3N-R64W-S19 L01

**Consent Decree Tank System Number:** 1945

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	6
Oil Tank Capacity (bbl):	300
# of Water Tanks:	1
Water Tank Capacity (bbl):	300
VOC Line Size Tanks to KO (in):	1 "
# VOC Lines Tanks to KO:	3
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70	70	70					
Dump Valve Size & Trim Size (in)	2" & 1"	2" & 1"	2" & 1"					

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	300	300	300	70	71	72		
Dump Valve Size & Trim Size (in)	2" & 1"	2" & 1"	2" & 1"	2" & 1"	2" & 1"	2" & 1"		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7	LEED 48" Gen 1 #7		
Number of Units	1	1		
Man. Capacity (MSCFD)	140	140		

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	31,934	31,980	0%
Calculated Burner Capacity (scfh)	5,355	11,667	
Headspace Surge Capacity (scfh)	104,743	104,743	
Total VCS Capacity (scfh)	110,098	116,410	
VCS Capacity minus PPIVF (scfh)	78,164	84,429	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 8/23/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/7/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **BUTTERBALL T3N-R64W-S19 L01**

Consent Decree Tank System Number: **1945**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	-0.90	-0.90	-0.90					
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77	0.77	0.77					
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	21.25	21.25	21.25					
Critical Pressure (psia) <sup>b</sup>	539	539	539					
Vapor Pressure (psia) <sup>c</sup>	83	83	83					
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.85	0.85	0.85					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	2409	2409	2409					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	55.2	55.2	55.2					
Working Flow (Mscfd) <sup>h,i</sup>	23	23	23					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77	0.77	0.77	0.77	0.77	0.77		
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	21.25	21.25	21.25	21.25	21.25	21.25		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	9903	9903	9903	5068	5098	5129		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	40	40	40	20	20	21		
Working Flow (Mscfd) <sup>l</sup>	56	56	56	28	29	29		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	34	6

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,897	6,897
Oil Tank Working Rate	2,864	2,857
Water Tank Flash Rate	7,501	7,484
Water Tank Working Rate	10,528	10,505
Tank Breathing Rate	1,664	1,664
Truck Loading Vapor	2,527	2,527
Total	31,980	31,934

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: BUTTERBALL T3N-R64W-S19 L01

Consent Decree Tank System Number: 1945

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

NEI response to follow up data request regarding headspace tank provided below. Data received 8/14/2018: Field verification for this facility was completed on or around 4/8/16, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header). Additionally, the Tank Truck Loadout Final Packet (provided in this 3rd Information Request Response titled 103\_BUTTERBALL T3N-R64W-S19 L01 TLO Final Packet) dated 11/2/16, provides additional confirmation that one tank was converted into a headspace tank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01**

Consent Decree Tank System Number: **523**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_FINAL PACKET	.pdf	5/18/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_STEM Engineering Evaluation_rev1	.xlsm	8/5/2016	STEM Engineering Evaluation Spreadsheet
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_FINAL PACKET	.pdf	5/18/2018	Work Request
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_FINAL PACKET	.pdf	5/18/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_WALKDOWN	.pdf	5/18/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_IR VERIFICAITON	.pdf	7/27/2016	IR Verification Field Data Sheet
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_1333_NORMAL	.mp4	7/26/2016	IR Camera Video Normal Operations
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_1334_DUMP	.mp4	7/26/2016	IR Camera Video During Dump Event
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_1335_POST	.mp4	7/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01**

**Consent Decree Tank System Number:** **523**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,459</b>	<b>5,460</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,446</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>37,760</b>	<b>37,760</b>	
Total VCS Capacity (scfh)	<b>40,206</b>	<b>43,593</b>	
VCS Capacity minus PPIVF (scfh)	<b>34,747</b>	<b>38,133</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/14/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01**

Consent Decree Tank System Number: **523**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>34</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,460</b>	<b>5,459</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CALLY BLUE DUFF GUTTERSEN T3N-R64W-S15 L01**

Consent Decree Tank System Number: **523**

**Audit Notes**

The stem work request (PG 3 of Final Packet pdf) states to disconnect tanks 5 & 6 from the fill header but leave connected to the VOC header to be used as headspace tanks however nowhere in the job sheets (PGs 22-26 of Final Packet pdf) does it state this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 5/9/2018, field verification confirmed that two tanks were converted to headspace tanks."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CALVARY USX T7N-R65W-S29 L01**

Consent Decree Tank System Number: **1407**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
CALVARY USX T7N-R65W-S29 L01_FINAL PACKET	.pdf	9/2/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
CALVARY USX T7N-R65W-S29 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	12/20/2017	STEM Engineering Evaluation Spreadsheet
CALVARY USX T7N-R65W-S29 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
CALVARY USX T7N-R65W-S29 L01_FINAL PACKET	.pdf	9/2/2015	Work Request
CALVARY USX T7N-R65W-S29 L01_FINAL PACKET	.pdf	9/2/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
CALVARY USX T7N-R65W-S29 L01_FINAL PACKET	.pdf	9/2/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
CALVARY USX T7N-R65W-S29 L01_IR VERIFICATION	.pdf	8/20/2015	IR Verification Field Data Sheet
CALVARY USX T7N-R65W-S29 L01_0238_NORMAL	.mp4	8/19/2015	IR Camera Video Normal Operations
CALVARY USX T7N-R65W-S29 L01_0239_DUMP	.mp4	8/19/2015	IR Camera Video During Dump Event
CALVARY USX T7N-R65W-S29 L01_0240_POST	.mp4	8/19/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
CALVARY USX T7N-R65W-S29 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CALVARY USX T7N-R65W-S29 L01**

**Consent Decree Tank System Number:** **1407**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>COMM 200 48"</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>157</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,452</b>	<b>7,453</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>8,111</b>	<b>11,142</b>	
Headspace Surge Capacity (scfh)	<b>21,944</b>	<b>21,944</b>	
Total VCS Capacity (scfh)	<b>30,055</b>	<b>33,086</b>	
VCS Capacity minus PPIVF (scfh)	<b>22,603</b>	<b>25,633</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/5/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/20/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CALVARY USX T7N-R65W-S29 L01**

Consent Decree Tank System Number: **1407**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,885</b>
Oil Tank Working Rate	<b>328</b>	<b>327</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,453</b>	<b>7,452</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CALVARY USX T7N-R65W-S29 L01**

Consent Decree Tank System Number: **1407**

**Audit Notes**

There is no request or verification that one of the tanks was bottomed out for headspace.  
On 5/16/2018 documentation was provided to verify the tank was bottomed out for headspace. The Tank Truck Loadout Final Packet (provided in this 2nd Information Request Response titled 068\_CALVARY USX T7N-R65W-S29 L01 TLO Final Packet) dated 12/21/16, provides confirmation that one tank was converted into a headspace tank.  
All equipment and emission sources properly accounted for. No need for additional information requests.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CANNON T3N-R65W-S35 L03**

Consent Decree Tank System Number: **425**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CANNON T3N-R65W-S35 L03_FINAL PACKET	.pdf	8/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CANNON T3N-R65W-S35 L03_STEM Engineering Evaluation_rev1	.xlsm	8/10/2017	STEM Engineering Evaluation Spreadsheet
CANNON T3N-R65W-S35 L03_SIGNED EVAL	.pdf	8/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CANNON T3N-R65W-S35 L03_FINAL PACKET	.pdf	8/10/2017	Work Request
CANNON T3N-R65W-S35 L03_FINAL PACKET	.pdf	8/10/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CANNON T3N-R65W-S35 L03_WALKDOWN	.pdf	8/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CANNON T3N-R65W-S35 L03_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
CANNON T3N-R65W-S35 L03_2239_NORMAL	.mp4	8/8/2017	IR Camera Video Normal Operations
CANNON T3N-R65W-S35 L03_2240_DUMP	.mp4	8/8/2017	IR Camera Video During Dump Event
CANNON T3N-R65W-S35 L03_2241_POST	.mp4	8/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CANNON T3N-R65W-S35 L03_SIGNED EVAL	.pdf	8/16/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CANNON T3N-R65W-S35 L03**

Consent Decree Tank System Number: **425**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>23,459</b>	<b>23,459</b>	
Total VCS Capacity (scfh)	<b>26,375</b>	<b>29,292</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,629</b>	<b>24,545</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/14/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CANNON T3N-R65W-S35 L03**

Consent Decree Tank System Number: **425**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

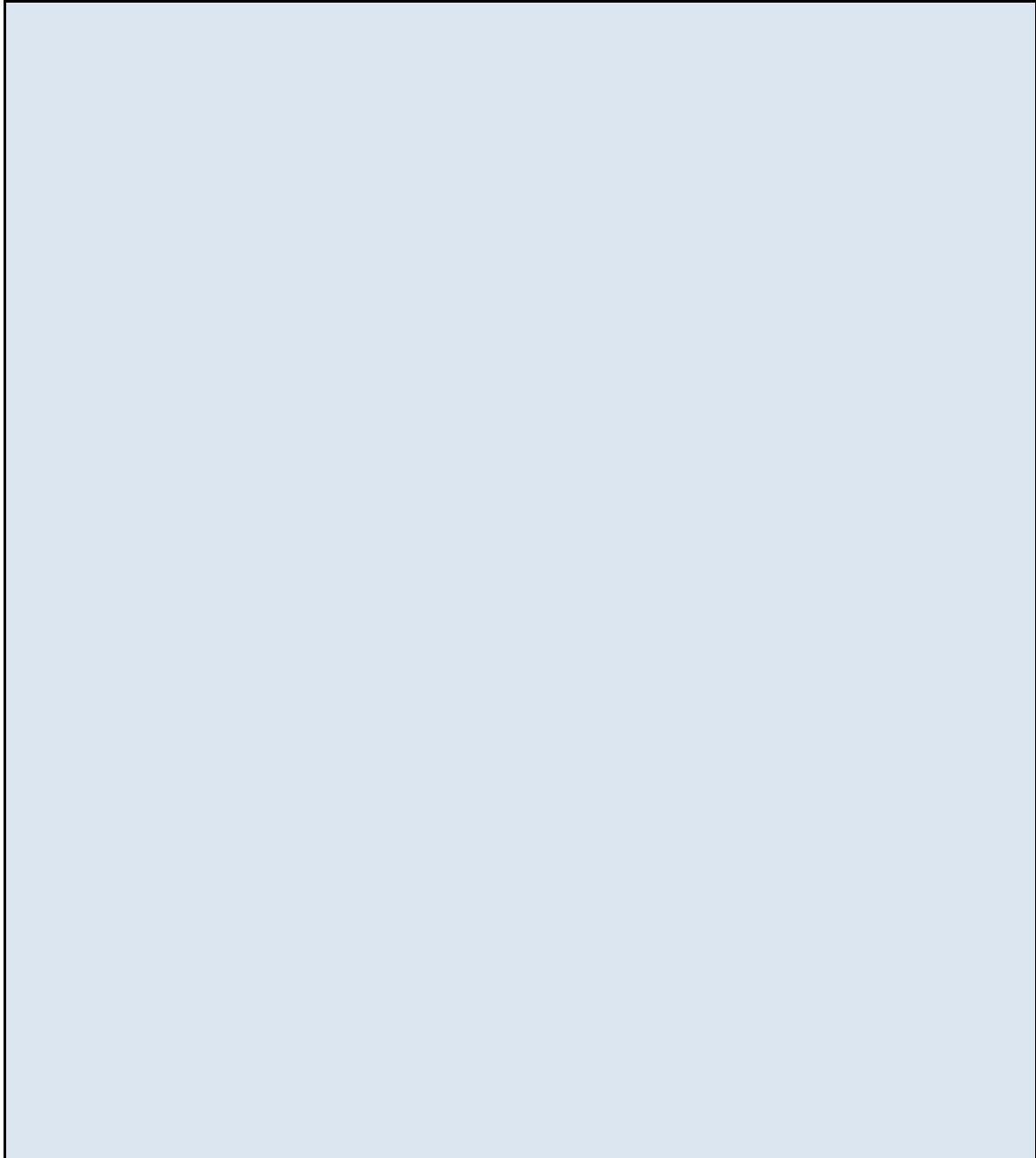
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CANNON T3N-R65W-S35 L03**

Consent Decree Tank System Number: **425**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CANTRELL DINNELL HERBST T4N-R64W-S22 L01**

Consent Decree Tank System Number: **476**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_FINAL PACKET	.pdf	9/25/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	9/29/2017	STEM Engineering Evaluation Spreadsheet
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_SIGNED EVAL	.pdf	10/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_FINAL PACKET	.pdf	9/25/2017	Work Request
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_FINAL PACKET	.pdf	9/25/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_WALKDOWN	.pdf	9/25/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_IR VERIFICATION	.pdf	9/19/2017	IR Verification Field Data Sheet
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_4756_NORMAL	.mp4	9/15/2017	IR Camera Video Normal Operations
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_4758_DUMP	.mp4	9/15/2017	IR Camera Video During Dump Event
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_4759_POST	.mp4	9/15/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CANTRELL DINNELL HERBST T4N-R64W-S22 L01_SIGNED EVAL	.pdf	10/12/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** CANTRELL DINNELL HERBST T4N-R64W-S22 L01

**Consent Decree Tank System Number:** 476

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,508	4,509	0%
Calculated Burner Capacity (scfh)	2,725	5,833	
Headspace Surge Capacity (scfh)	14,762	14,762	
Total VCS Capacity (scfh)	17,487	20,595	
VCS Capacity minus PPIVF (scfh)	12,979	16,086	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/14/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CANTRELL DINNELL HERBST T4N-R64W-S22 L01**

Consent Decree Tank System Number: **476**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CANTRELL DINNELL HERBST T4N-R64W-S22 L01**

Consent Decree Tank System Number: **476**

**Audit Notes**

The stem work request (PG 3 of Final Packet pdf) states to disconnect and bottom out 1 tank from fill header but leave connected to the VOC header to be used as a headspace tank however nowhere in the job sheets (PGs 22-26 of Final Packet pdf) does it state this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 6/28/2017, field verification confirmed that one tank was converted to a headspace tank."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARLSON T8N-R60W-S23 L01**

Consent Decree Tank System Number: **1629**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CARLSON T8N-R60W-S23 L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CARLSON T8N-R60W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	8/28/2017	STEM Engineering Evaluation Spreadsheet
CARLSON T8N-R60W-S23 L01_SIGNED EVAL	.pdf	9/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CARLSON T8N-R60W-S23 L01_FINAL PACKET	.pdf	8/4/2017	Work Request
CARLSON T8N-R60W-S23 L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets
2018 Draft Attachements to Comment Letter	.pdf	3/27/2020	Supplimental Completion Documentation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CARLSON T8N-R60W-S23 L01_FINAL PACKET	.pdf	8/4/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CARLSON T8N-R60W-S23 L01_IR VERIFICATION	.pdf	8/4/2017	IR Verification Field Data Sheet
CARLSON T8N-R60W-S23 L01_2215_NORMAL	.mp4	8/3/2017	IR Camera Video Normal Operations
CARLSON T8N-R60W-S23 L01_2216_DUMP	.mp4	8/3/2017	IR Camera Video During Dump Event
CARLSON T8N-R60W-S23 L01_2217_POST	.mp4	8/3/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CARLSON T8N-R60W-S23 L01_SIGNED EVAL	.pdf	9/12/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CARLSON T8N-R60W-S23 L01**

**Consent Decree Tank System Number:** **1629**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>40</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>28,319</b>	<b>28,328</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>235,172</b>	<b>235,172</b>	
Total VCS Capacity (scfh)	<b>237,897</b>	<b>241,005</b>	
VCS Capacity minus PPIVF (scfh)	<b>209,578</b>	<b>212,678</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/5/2018  
 Audit Document Review Verified by: Craig Bock and James Van Horne  
 Audit Document Verification Date: 8/8/2018 and 7/6/2020



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARLSON T8N-R60W-S23 L01**

Consent Decree Tank System Number: **1629**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.16</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.28</b>							
Gas/Oil Ratio (scf/bbl)	<b>65.7</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>107.00</b>							
Critical Pressure (psia) <sup>b</sup>	<b>512</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>53</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.87</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>8893</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>583.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>85</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>24,329</b>	<b>24,329</b>
Oil Tank Working Rate	<b>3,524</b>	<b>3,515</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>28,328</b>	<b>28,319</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARLSON T8N-R60W-S23 L01**

Consent Decree Tank System Number: **1629**

**Audit Notes**

The only documentation identifying 40 psig as the maximum operating pressure is found in Noble signed eval. Documentation found in the Final Packet indicates the PSHH for the LP separator is set to 70 psi. Noble provided additional information on 3/27/2020 in response to the draft audit report confirming the PSHH is set to 40 psig.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARPIO GRUEN OTTINGER T6N-R64W-S22 L01**

Consent Decree Tank System Number: **285**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_FINAL PACKET	.pdf	10/14/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	6/6/2018	STEM Engineering Evaluation Spreadsheet
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_FINAL PACKET	.pdf	10/14/2015	Work Request
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_FINAL PACKET	.pdf	10/14/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_WALKDOWN	.pdf	9/23/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_IR VERIFICATION	.pdf	9/23/2015	IR Verification Field Data Sheet
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_0291_NORMAL	.mp4	9/22/2015	IR Camera Video Normal Operations
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_0292_DUMP	.mp4	9/22/2015	IR Camera Video During Dump Event
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_0293_POST	.mp4	9/22/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CARPIO GRUEN OTTINGER T6N-R64W-S22 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARPIO GRUEN OTTINGER T6N-R64W-S22 L01**

Consent Decree Tank System Number: **285**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,748</b>	<b>12,751</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,961</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>12,531</b>	<b>12,531</b>	
Total VCS Capacity (scfh)	<b>17,492</b>	<b>19,073</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,744</b>	<b>6,322</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 7/19/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARPIO GRUEN OTTINGER T6N-R64W-S22 L01**

Consent Decree Tank System Number: **285**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>12,751</b>	<b>12,748</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARPIO GRUEN OTTINGER T6N-R64W-S22 L01**

Consent Decree Tank System Number: **285**

**Audit Notes**

No information in the provided documentation as to whether the HP oil from Carpio 22-4-19, 43 / Gruen 22-31,33,35 was routed to the LP side of the HLP separator. It appears via the automation email dated February 11, 2016, the wells in question were re-routed to the LP protions of the HLP separator.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARPIO T6N-R64W-S26 L01**

Consent Decree Tank System Number: **1328**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CARPIO T6N-R64W-S26 L01_FINAL PACKET	.pdf	2/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CARPIO T6N-R64W-S26 L01_STEM Engineering Evaluation_rev 1	.xlsm	7/7/2016	STEM Engineering Evaluation Spreadsheet
CARPIO T6N-R64W-S26 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CARPIO T6N-R64W-S26 L01_FINAL PACKET	.pdf	2/29/2016	Work Request
CARPIO T6N-R64W-S26 L01_FINAL PACKET	.pdf	2/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CARPIO T6N-R64W-S26 L01_FINAL PACKET	.pdf	2/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CARPIO T6N-R64W-S26 L01_IR VERIFICATION	.pdf	2/26/2016	IR Verification Field Data Sheet
CARPIO T6N-R64W-S26 L01_0097_NORMAL	.mp4	2/25/2016	IR Camera Video Normal Operations
CARPIO T6N-R64W-S26 L01_0098_DUMP	.mp4	2/25/2016	IR Camera Video During Dump Event
CARPIO T6N-R64W-S26 L01_0099_POST	.mp4	2/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CARPIO T6N-R64W-S26 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARPIO T6N-R64W-S26 L01**

Consent Decree Tank System Number: **1328**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,271</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,467</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>602</b>	<b>602</b>	
Total VCS Capacity (scfh)	<b>5,069</b>	<b>7,144</b>	
VCS Capacity minus PPIVF (scfh)	<b>798</b>	<b>2,872</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARPIO T6N-R64W-S26 L01**

Consent Decree Tank System Number: **1328**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,271</b>	<b>4,271</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CARPIO T6N-R64W-S26 L01**

Consent Decree Tank System Number: **1328**

**Audit Notes**

The stem work request form (PG 3 of FINAL PACKET pdf) states reduce the oil dump trim size is 1/2" however nowhere in the job sheets (PGs 20 through 23 of FINAL PACKET pdf) does it confirm this task was completed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR FED T8N-R59W-S17 L01**

Consent Decree Tank System Number: **2021**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
CASTOR FED T8N-R59W-S17 L01_FINAL PACKET	.pdf	4/15/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
CASTOR FED T8N-R59W-S17 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
CASTOR FED T8N-R59W-S17 L01_SIGNED EVAL	.pdf	7/27/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
CASTOR FED T8N-R59W-S17 L01_FINAL PACKET	.pdf	4/15/2016	Work Request
CASTOR FED T8N-R59W-S17 L01_FINAL PACKET	.pdf	4/15/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
CASTOR FED T8N-R59W-S17 L01_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
CASTOR FED T8N-R59W-S17 L01_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
CASTOR FED T8N-R59W-S17 L01_0345_NORMAL	.mp4	4/14/2016	IR Camera Video Normal Operations
CASTOR FED T8N-R59W-S17 L01_0346_DUMP	.mp4	4/14/2016	IR Camera Video During Dump Event
CASTOR FED T8N-R59W-S17 L01_0347_POST	.mp4	4/14/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
CASTOR FED T8N-R59W-S17 L01_SIGNED EVAL	.pdf	7/27/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR FED T8N-R59W-S17 L01**

Consent Decree Tank System Number: **2021**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>	<b>175</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>68,933</b>	<b>68,939</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,856</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>137,141</b>	<b>137,141</b>	
Total VCS Capacity (scfh)	<b>142,997</b>	<b>147,527</b>	
VCS Capacity minus PPIVF (scfh)	<b>74,064</b>	<b>78,589</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 1/2/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 1/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR FED T8N-R59W-S17 L01**

Consent Decree Tank System Number: **2021**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.72</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.83</b>							
Gas/Oil Ratio (scf/bbl)	<b>348.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>633</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>188</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4120</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1433.8</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>39</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>7663</b>	<b>7663</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>31</b>	<b>31</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>43</b>	<b>43</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>59,740</b>	<b>59,740</b>
Oil Tank Working Rate	<b>1,632</b>	<b>1,628</b>
Water Tank Flash Rate	<b>2,554</b>	<b>2,554</b>
Water Tank Working Rate	<b>3,586</b>	<b>3,585</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>68,939</b>	<b>68,933</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR FED T8N-R59W-S17 L01**

Consent Decree Tank System Number: **2021**

**Audit Notes**

The walkdown checklist was not marked as complete. Completion was verified through other documentation in the final packet.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR T8N-R59W-S10 L01**

Consent Decree Tank System Number: **2010**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CASTOR T8N-R59W-S10 L01_FINAL PACKET	.pdf	4/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T8N-R59W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
CASTOR T8N-R59W-S10 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T8N-R59W-S10 L01_FINAL PACKET	.pdf	4/29/2016	Work Request
CASTOR T8N-R59W-S10 L01_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T8N-R59W-S10 L01_WALKDOWN	.pdf	4/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T8N-R59W-S10 L01_IR VERIFICATION	.pdf	4/27/2016	IR Verification Field Data Sheet
CASTOR T8N-R59W-S10 L01_0931_NORMAL	.mp4	4/27/2016	IR Camera Video Normal Operations
CASTOR T8N-R59W-S10 L01_0932_DUMP	.mp4	4/27/2016	IR Camera Video During Dump Event
CASTOR T8N-R59W-S10 L01_0933_POST	.mp4	4/27/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T8N-R59W-S10 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CASTOR T8N-R59W-S10 L01**

**Consent Decree Tank System Number:** **2010**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>160</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>160</b>	<b>160</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>30</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>61,316</b>	<b>61,321</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,673</b>	<b>7,083</b>	
Headspace Surge Capacity (scfh)	<b>133,134</b>	<b>133,134</b>	
Total VCS Capacity (scfh)	<b>136,807</b>	<b>140,217</b>	
VCS Capacity minus PPIVF (scfh)	<b>75,491</b>	<b>78,896</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 4/18/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR T8N-R59W-S10 L01**

Consent Decree Tank System Number: **2010**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.63</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.74</b>							
Gas/Oil Ratio (scf/bbl)	<b>307.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>619</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>173</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3904</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1198.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>37</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>7349</b>	<b>7349</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>29</b>	<b>29</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>41</b>	<b>41</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>49,933</b>	<b>49,933</b>
Oil Tank Working Rate	<b>1,547</b>	<b>1,543</b>
Water Tank Flash Rate	<b>2,450</b>	<b>2,449</b>
Water Tank Working Rate	<b>3,438</b>	<b>3,438</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>61,321</b>	<b>61,316</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR T8N-R59W-S10 L01**

Consent Decree Tank System Number: **2010**

**Audit Notes**

The separator pneumatic PSHH is set by the operator not automation and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 160 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR T9N-R59W-S34 L01**

Consent Decree Tank System Number: **2013**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CASTOR T9N-R59W-S34 L01_FINAL PACKET	.pdf	1/3/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T9N-R59W-S34 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/11/2017	STEM Engineering Evaluation Spreadsheet
CASTOR T9N-R59W-S34 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T9N-R59W-S34 L01_FINAL PACKET	.pdf	1/3/2018	Work Request
CASTOR T9N-R59W-S34 L01_FINAL PACKET	.pdf	1/3/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T9N-R59W-S34 L01_FINAL PACKET	.pdf	1/3/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T9N-R59W-S34 L01_IR VERIFICATION	.pdf	8/1/2016	IR Verification Field Data Sheet
CASTOR T9N-R59W-S34 L01_1340_NORMAL	.mp4	7/28/2016	IR Camera Video Normal Operations
CASTOR T9N-R59W-S34 L01_1341_DUMP	.mp4	7/28/2016	IR Camera Video During Dump Event
CASTOR T9N-R59W-S34 L01_1342_POST	.mp4	7/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CASTOR T9N-R59W-S34 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CASTOR T9N-R59W-S34 L01**

**Consent Decree Tank System Number:** **2013**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>	<b>175</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>71,460</b>	<b>71,466</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,856</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>137,386</b>	<b>137,386</b>	
Total VCS Capacity (scfh)	<b>143,242</b>	<b>147,772</b>	
VCS Capacity minus PPIVF (scfh)	<b>71,782</b>	<b>76,307</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/5/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR T9N-R59W-S34 L01**

Consent Decree Tank System Number: **2013**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.72</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.83</b>							
Gas/Oil Ratio (scf/bbl)	<b>348.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>633</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>188</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4120</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1433.8</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>39</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>7663</b>	<b>7663</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>31</b>	<b>31</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>43</b>	<b>43</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

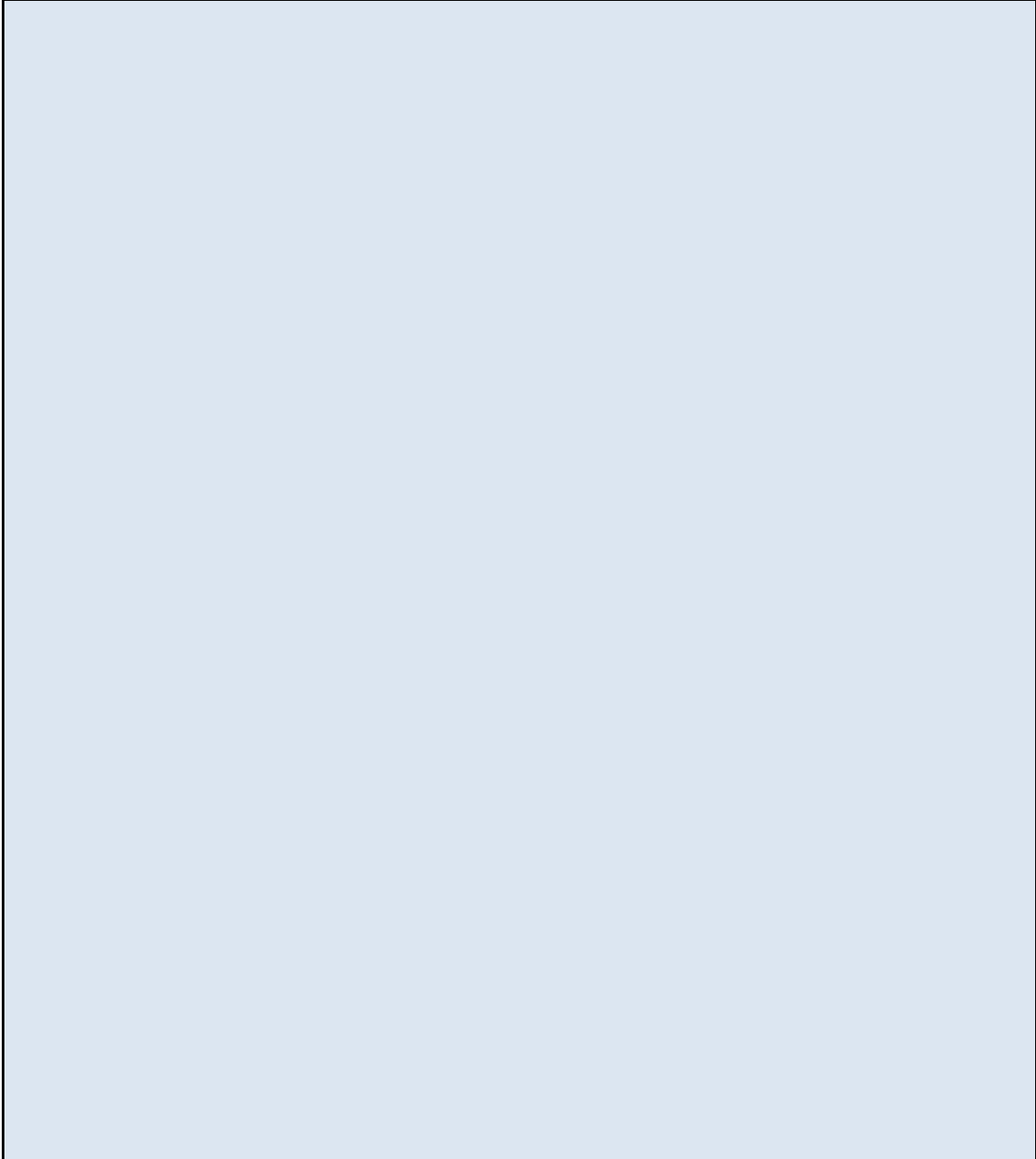
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>59,740</b>	<b>59,740</b>
Oil Tank Working Rate	<b>1,632</b>	<b>1,628</b>
Water Tank Flash Rate	<b>2,554</b>	<b>2,554</b>
Water Tank Working Rate	<b>3,586</b>	<b>3,585</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>71,466</b>	<b>71,460</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CASTOR T9N-R59W-S34 L01**

Consent Decree Tank System Number: **2013**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CDOT T5N-R65W-S1 L01**

Consent Decree Tank System Number: **1458**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CDOT T5N-R65W-S1 L01_FINAL PACKET	.pdf	5/18/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CDOT T5N-R65W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	10/10/2017	STEM Engineering Evaluation Spreadsheet
CDOT T5N-R65W-S1 L01_SIGNED EVAL	.pdf	10/17/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CDOT T5N-R65W-S1 L01_FINAL PACKET	.pdf	5/18/2018	Work Request
CDOT T5N-R65W-S1 L01_FINAL PACKET	.pdf	5/18/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CDOT T5N-R65W-S1 L01_WALKDOWN	.pdf	10/5/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CDOT T5N-R65W-S1 L01_IR VERIFICATION	.pdf	9/30/2016	IR Verification Field Data Sheet
CDOT T5N-R65W-S1 L01_1560_NORMAL	.mp4	9/29/2016	IR Camera Video Normal Operations
CDOT T5N-R65W-S1 L01_1561_DUMP	.mp4	9/29/2016	IR Camera Video During Dump Event
CDOT T5N-R65W-S1 L01_1562_POST	.mp4	9/29/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CDOT T5N-R65W-S1 L01_SIGNED EVAL	.pdf	10/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** CDOT T5N-R65W-S1 L01  
**Consent Decree Tank System Number:** 1458

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>248</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,468</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,024</b>	<b>1,013</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
Audit Document Review Date: 6/22/2018  
Audit Document Review Verified by: Angela M. Oberlander  
Audit Document Verification Date: 8/9/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CDOT T5N-R65W-S1 L01**

Consent Decree Tank System Number: **1458**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CDOT T5N-R65W-S1 L01**

Consent Decree Tank System Number: **1458**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

A new LP separator was installed to create an HP/LP train. There is no confirmation of the oil dump valve size associated with the new LP separator, thus a 2" valve with a 1/2" trim was included in the audit as a conservative evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL T7N-R64W-S32 L01**

Consent Decree Tank System Number: **1678**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CECIL T7N-R64W-S32 L01_FINAL PACKET	.pdf	5/19/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CECIL T7N-R64W-S32 L01_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation
CECIL T7N-R64W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	10/12/2017	STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
CECIL T7N-R64W-S32 L01_FINAL PACKET	.pdf	5/19/2017	Work Request
CECIL T7N-R64W-S32 L01_FINAL PACKET	.pdf	5/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CECIL T7N-R64W-S32 L01_WALKDOWN	.pdf	5/19/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CECIL T7N-R64W-S32 L01_IR VERIFICATION	.pdf	5/19/2017	IR Verification Field Data Sheet
CECIL T7N-R64W-S32 L01_2059_NORMAL	.mp4	5/15/2017	IR Camera Video Normal Operations
CECIL T7N-R64W-S32 L01_2060_DUMP	.mp4	5/15/2017	IR Camera Video During Dump Event
CECIL T7N-R64W-S32 L01_2061_POST	.mp4	5/15/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CECIL T7N-R64W-S32 L01_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL T7N-R64W-S32 L01**

Consent Decree Tank System Number: **1678**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>10,137</b>	<b>10,137</b>	
Total VCS Capacity (scfh)	<b>13,064</b>	<b>15,970</b>	
VCS Capacity minus PPIVF (scfh)	<b>9,759</b>	<b>12,664</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/8/2017

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL T7N-R64W-S32 L01**

Consent Decree Tank System Number: **1678**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL T7N-R64W-S32 L01**

Consent Decree Tank System Number: **1678**

**Audit Notes**

There are 2 - 400 bbl oil tanks on-site, but one tank has been emptied and turned into a surge protection tank. It has been disconnected from the liquid fill line. Final Packet pg. 23

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** CECIL USX T6N-R64W-S1 L01

**Consent Decree Tank System Number:** 1986

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L01_FINAL PACKET	.pdf	8/19/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	6/20/2017	STEM Engineering Evaluation Spreadsheet
CECIL USX T6N-R64W-S1 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L01_FINAL PACKET	.pdf	8/19/2015	Work Request
CECIL USX T6N-R64W-S1 L01_FINAL PACKET	.pdf	8/19/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L01_FINAL PACKET	.pdf	8/19/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L01_IR VERIFICATION	.pdf	8/19/2015	IR Verification Field Data Sheet
CECIL USX T6N-R64W-S1 L01_0232_NORMAL	.mp4	8/17/2015	IR Camera Video Normal Operations
CECIL USX T6N-R64W-S1 L01_0233_DUMP	.mp4	8/17/2015	IR Camera Video During Dump Event
CECIL USX T6N-R64W-S1 L01_0234_POST	.mp4	8/17/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CECIL USX T6N-R64W-S1 L01**

**Consent Decree Tank System Number:** **1986**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>57,294</b>	<b>57,316</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,051</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>108,524</b>	<b>108,524</b>	
Total VCS Capacity (scfh)	<b>113,575</b>	<b>115,066</b>	
VCS Capacity minus PPIVF (scfh)	<b>56,281</b>	<b>57,749</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury

Audit Document Review Date: 3/5/2018

Audit Document Review Verified by: Craig Bock

Audit Document Verification Date: 10/1/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL USX T6N-R64W-S1 L01**

Consent Decree Tank System Number: **1986**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	-0.90	-0.90	-0.90					
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77					
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25					
Critical Pressure (psia) <sup>b</sup>	833	833	833					
Vapor Pressure (psia) <sup>c</sup>	407	407	407					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76	0.76					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	6905	6905	6905					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	158.2	158.2	158.2					
Working Flow (Mscfd) <sup>h,i</sup>	66	66	66					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77	0.77	0.77		
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	11381	11381	11381	11381	11381	11381		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	46	46	46	46	46	46		
Working Flow (Mscfd) <sup>l</sup>	64	64	64	64	64	64		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>i</sup>	396	396
Mscfd	29	19

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	19,769	19,769
Oil Tank Working Rate	8,209	8,188
Water Tank Flash Rate	11,381	11,381
Water Tank Working Rate	15,976	15,975
Tank Breathing Rate	1,981	1,981
Truck Loading Vapor	0	0
<b>Total</b>	<b>57,316</b>	<b>57,294</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL USX T6N-R64W-S1 L01**

Consent Decree Tank System Number: **1986**

**Audit Notes**

Page 8 of the Final Packet indicates a 6" diameter vapor collection line from the KO drum to the burner. The Noble STEM evaluation lists 4" diameter vapor collection pipe which is a conservative value.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL USX T6N-R64W-S1 L03**

Consent Decree Tank System Number: **590**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L03_FINAL PACKET	.pdf	8/25/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L03_STEM Engineering Evaluation_rev1_with TLO	.xlsm	12/1/2017	STEM Engineering Evaluation Spreadsheet
CECIL USX T6N-R64W-S1 L03_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation
092_CECIL USX T6N-R64W-S1 L03_STEM Engineering Evaluation_rev1_with TLO_correction	.pdf	8/15/2018	Corrected STEM Engineering Evaluation Spreadsheet
092_CECIL USX T6N-R64W-S1 L03_SIGNED EVAL_rev_2	.pdf	8/15/2018	Updated Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L03_FINAL PACKET	.pdf	8/25/2015	Work Request
CECIL USX T6N-R64W-S1 L03_FINAL PACKET	.pdf	8/25/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L03_WALKDOWN	.pdf	8/25/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L03_IR VERIFICATION	.pdf	8/20/2015	IR Verification Field Data Sheet
CECIL USX T6N-R64W-S1 L03_0235_NORMAL	.mp4	8/19/2015	IR Camera Video Normal Operations
CECIL USX T6N-R64W-S1 L03_0236_DUMP	.mp4	8/19/2015	IR Camera Video During Dump Event
CECIL USX T6N-R64W-S1 L03_0237_POST	.mp4	8/19/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
CECIL USX T6N-R64W-S1 L03_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation
092_CECIL USX T6N-R64W-S1 L03_SIGNED EVAL_rev_2	.pdf	8/15/2018	Updated Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL USX T6N-R64W-S1 L03**

Consent Decree Tank System Number: **590**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>9</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>6 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>	<b>60</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>60</b>	<b>60</b>	<b>60</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>COMM 200 48"</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>157</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>50,490</b>	<b>23,588</b>	<b>-53%</b>
Calculated Burner Capacity (scfh)	<b>7,974</b>	<b>12,375</b>	
Headspace Surge Capacity (scfh)	<b>94,455</b>	<b>94,455</b>	
Total VCS Capacity (scfh)	<b>102,429</b>	<b>106,830</b>	
VCS Capacity minus PPIVF (scfh)	<b>51,939</b>	<b>83,242</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/20/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CECIL USX T6N-R64W-S1 L03**

Consent Decree Tank System Number: **590**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61	0.61					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	0.72	0.72	0.72					
Gas/Oil Ratio (scf/bbl)	96.4	96.4	96.4					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78					
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20					
Critical Pressure (psia) <sup>b</sup>	530	530	530					
Vapor Pressure (psia) <sup>c</sup>	73	73	73					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86	0.86					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	759	759	759					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2	73.2	73.2					
Working Flow (Mscfd) <sup>h,i</sup>	7	7	7					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78	0.78	0.78	0.78		
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20	7.20	7.20	7.20		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	3906	3906	3906	1629	1629	1629		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	16	16	16	7	7	7		
Working Flow (Mscfd) <sup>l</sup>	22	22	22	9	9	9		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>i</sup>	396	396
Mscfd	86	19

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	9,146	33,962
Oil Tank Working Rate	903	2,857
Water Tank Flash Rate	2,768	2,823
Water Tank Working Rate	3,885	3,962
Tank Breathing Rate	4,359	4,359
Truck Loading Vapor	2,527	2,527
Total	23,588	50,490

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** CECIL USX T6N-R64W-S1 L03

**Consent Decree Tank System Number:** 590

**Audit Notes**

The walkdown checklist (CECIL USX T6N-R64W-S1 L03\_0237\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (CECIL USX T6N-R64W-S1 L03\_0237\_FINAL PACKET).

The walkdown checklist (CECIL USX T6N-R64W-S1 L03\_0237\_WALKDOWN, p 4) states there are 9 oil tanks, 2 water tanks, and 1 tank that is out of service. This contradicts the signed eval (CECIL USX T6N-R64W-S1 L03\_0237\_SIGNED EVAL) which states there are 9 oil and 3 water tanks on site. The model (CECIL USX T6N-R64W-S1 L03\_STEM Engineering Evaluation\_rev1\_with TLO) was run with 12 tanks. Additional data was requested and was provided by Noble on 8/15/2018. Noble responded with an updated signed evaluation dated 7/17/2018 with 9 oil and 2 water tanks.

The work request states that the automated PSHH on the LP separators were to be set to 60 psig (CECIL USX T6N-R64W-S1 L03\_FINAL PACKET, p 3). An email from 7/29/2015 states that all 3 pressure switches were set to 60 lbs. (CECIL USX T6N-R64W-S1 L03\_FINAL PACKET, p 24). The signed eval from 12/1/2017 and 8/15/2015 has LP separator PSHH set to 70 lbs. The modeling guideline was still applied correctly since the signed evaluation overestimates actual PPIVF.

The STEM work request (CECIL USX T6N-R64W-S1 L03\_FINAL PACKET, p 3) requests the oil dump trims be reduced to 1/2". The job sheet (CECIL USX T6N-R64W-S1 L03\_FINAL PACKET, p 19) confirms both the oil and water trims were updated to 1/2". However, the signed eval (CECIL USX T6N-R64W-S1 L03\_SIGNED EVAL, p 2) and model (CECIL USX T6N-R64W-S1 L03\_STEM Engineering Evaluation\_rev1\_with TLO) were run with 1" oil trims. The modeling guideline was still applied correctly since the signed evaluation overestimates actual PPIVF.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CERVI USX T4N-R63W-S23 L01**

Consent Decree Tank System Number: **457**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S23 L01_FINAL PACKET	.pdf	8/16/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	7/7/2016	STEM Engineering Evaluation Spreadsheet
CERVI USX T4N-R63W-S23 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S23 L01_FINAL PACKET	.pdf	8/16/2016	Work Request
CERVI USX T4N-R63W-S23 L01_FINAL PACKET	.pdf	8/16/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S23 L01_WALKDOWN	.pdf	2/1/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S23 L01_IR VERIFICATION	.pdf	1/29/2016	IR Verification Field Data Sheet
CERVI USX T4N-R63W-S23 L01_0641_NORMAL	.mp4	1/28/2016	IR Camera Video Normal Operations
CERVI USX T4N-R63W-S23 L01_0642_DUMP	.mp4	1/28/2016	IR Camera Video During Dump Event
CERVI USX T4N-R63W-S23 L01_0643_POST	.mp4	1/28/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S23 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CERVI USX T4N-R63W-S23 L01**

Consent Decree Tank System Number: **457**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,787</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>987</b>	<b>948</b>	
Total VCS Capacity (scfh)	<b>4,774</b>	<b>5,501</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,093</b>	<b>1,676</b>	

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 6/22/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/9/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CERVI USX T4N-R63W-S23 L01**

Consent Decree Tank System Number: **457**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CERVI USX T4N-R63W-S23 L01**

Consent Decree Tank System Number: **457**

**Audit Notes**

The work request indicated the Cervi USX CC23-02 separator was to be converted to the LP unit in the train (Final Packet, pg 3). The Job Sheet indicated the Cervi 11-23 unit was the unit converted (Final Packet, pg 24) and the corresponding oil dump valve on this unit was a 2" 212 SMA. Audit evaluation completed with a 2" valve w/ 1/2" trim (trim confirmed via Walkdown Checklist item A1).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CERVI USX T4N-R63W-S35 L01**

Consent Decree Tank System Number: **455**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S35 L01_FINAL PACKET	.pdf	2/9/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S35 L01_STEM Engineering Evaluation_rev1	.xlsm	9/5/2017	STEM Engineering Evaluation Spreadsheet
CERVI USX T4N-R63W-S35 L01_SIGNED EVAL	.pdf	6/14/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S35 L01_FINAL PACKET	.pdf	2/9/2016	Work Request
CERVI USX T4N-R63W-S35 L01_FINAL PACKET	.pdf	2/9/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S35 L01_WALKDOWN	.pdf	1/28/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S35 L01_IR VERIFICATION	.pdf	2/5/2016	IR Verification Field Data Sheet
CERVI USX T4N-R63W-S35 L01_0669_NORMAL	.mp4	2/5/2016	IR Camera Video Normal Operations
CERVI USX T4N-R63W-S35 L01_0670_DUMP	.mp4	2/5/2016	IR Camera Video During Dump Event
CERVI USX T4N-R63W-S35 L01_0671_POST	.mp4	2/5/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CERVI USX T4N-R63W-S35 L01_SIGNED EVAL	.pdf	6/14/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CERVI USX T4N-R63W-S35 L01**

Consent Decree Tank System Number: **455**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,787</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>2,870</b>	<b>2,870</b>	
Total VCS Capacity (scfh)	<b>6,657</b>	<b>7,423</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,149</b>	<b>2,914</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 1/29/2018

Audit Document Review Verified by: Nick Michaelson

Audit Document Verification Date: 2/8/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CERVI USX T4N-R63W-S35 L01**

Consent Decree Tank System Number: **455**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CERVI USX T4N-R63W-S35 L01**

Consent Decree Tank System Number: **455**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 12-17) are not dated. Assumed the date is the same as Facility Scouting date (10/20/2015).

**2. Facility walkdown checklist inconsistency**

Item C6 of the Walkdown Checklist (Final Packet, pg 10) is checked "yes", indicating multiple HP oil dumps tie into a single LP separator. There is one HP separator onsite, therefore multiple HP oil dumps is not possible on this site.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01**

Consent Decree Tank System Number: **1344**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_FINAL PACKET	.pdf	7/24/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	7/24/2017	STEM Engineering Evaluation Spreadsheet
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_SIGNED EVAL	.pdf	7/25/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_FINAL PACKET	.pdf	7/24/2017	Work Request
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_FINAL PACKET	.pdf	7/24/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_FINAL PACKET	.pdf	7/24/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_IR VERIFICATION	.pdf	7/21/2017	IR Verification Field Data Sheet
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_2151_NORMAL	.mp4	7/20/2017	IR Camera Video Normal Operations
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_2152_DUMP	.mp4	7/20/2017	IR Camera Video During Dump Event
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_2153_POST	.mp4	7/20/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01_SIGNED EVAL	.pdf	7/25/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01**

**Consent Decree Tank System Number:** **1344**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>171</b>	<b>171</b>	
Total VCS Capacity (scfh)	<b>4,198</b>	<b>5,129</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,130</b>	<b>2,060</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01**

Consent Decree Tank System Number: **1344**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	694							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	61.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,556	2,556
Oil Tank Working Rate	275	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S19 L01**

Consent Decree Tank System Number: **1344**

**Audit Notes**

The walkdown had to be used to verify that existing dump valves were switched from 212s to 1400s with 1" valve and 1/2" trim.

Cannot verify 2" line from tank to KO was replaced with 3" line.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 5/8/2017; field verification confirmed that the 3" VOC line from the tank to the KO pot was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01**

Consent Decree Tank System Number: **1345**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_FINAL PACKET	PDF	No Date	Field Datasheet

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_SIGNED EVAL	PDF	5/22/2017	Engineering Evaluation Summary

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_FINAL PACKET	PDF	2/1/2017	STEM Work Request Form
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_FINAL PACKET	PDF	4/18/2017	Job Sheet

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_FINAL PACKET	PDF	5/17/2017	STEM Retrofit Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_FINAL PACKET	PDF	5/17/2017	IR Camera Verification Documentation
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_2077_NORMAL	MP4	5/17/2017	IR Video Normal
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_2078_DUMP	MP4	5/17/2017	IR Video Dump
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_2079_POST	MP4	5/17/2017	IR Video Post

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01_SIGNED EVAL	PDF	5/22/2017	Engineering Evaluation Summary



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01**

**Consent Decree Tank System Number:** **1345**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>171</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,198</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,130</b>	<b>2,639</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Erin Ehrmantraut  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01**

Consent Decree Tank System Number: **1345**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHAMPLIN AMOCO GUTTERSEN T3N-R63W-S29 L01**

Consent Decree Tank System Number: **1345**

**Audit Notes**

A new HP-LP separator was brought on-site to replace the HP separator. Could not verify the oil dump valve size (2" or 1") of the new HP-LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHANDLER ST T3N-R64W-S15 L01**

Consent Decree Tank System Number: **2370**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CHANDLER ST T3N-R64W-S15 L01_FINAL PACKET	.pdf	6/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CHANDLER ST T3N-R64W-S15 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	11/21/2017	STEM Engineering Evaluation Spreadsheet
CHANDLER ST T3N-R64W-S15 L01_SIGNED EVAL	.pdf	12/5/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CHANDLER ST T3N-R64W-S15 L01_FINAL PACKET	.pdf	6/16/2016	Work Request
CHANDLER ST T3N-R64W-S15 L01_FINAL PACKET	.pdf	6/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CHANDLER ST T3N-R64W-S15 L01_FINAL PACKET	.pdf	6/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CHANDLER ST T3N-R64W-S15 L01_IR VERIFICATION	.pdf	6/14/2016	IR Verification Field Data Sheet
CHANDLER ST T3N-R64W-S15 L01_1096_NORMAL	.mp4	6/6/2016	IR Camera Video Normal Operations
CHANDLER ST T3N-R64W-S15 L01_1097_DUMP	.mp4	6/6/2016	IR Camera Video During Dump Event
CHANDLER ST T3N-R64W-S15 L01_1098_POST	.mp4	6/6/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CHANDLER ST T3N-R64W-S15 L01_SIGNED EVAL	.pdf	12/5/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHANDLER ST T3N-R64W-S15 L01**

Consent Decree Tank System Number: **2370**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>9</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>3</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>	<b>COMM 200 48"</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>157</b>	<b>157</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>31,921</b>	<b>33,356</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>8,758</b>	<b>13,083</b>	
Headspace Surge Capacity (scfh)	<b>39,992</b>	<b>39,992</b>	
Total VCS Capacity (scfh)	<b>48,750</b>	<b>53,075</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,829</b>	<b>19,720</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury

Audit Document Review Date: 3/20/2018

Audit Document Review Verified by: Chris Boggess

Audit Document Verification Date: 7/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHANDLER ST T3N-R64W-S15 L01**

Consent Decree Tank System Number: **2370**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	-0.90	-0.90	-0.90					
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78					
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20					
Critical Pressure (psia) <sup>b</sup>	833	833	833					
Vapor Pressure (psia) <sup>c</sup>	407	407	407					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76	0.76					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	2370	2370	2370					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	54.3	54.3	54.3					
Working Flow (Mscfd) <sup>h,i</sup>	23	23	23					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.78	0.78	0.78		
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	7.20	7.20	7.20		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	11381	11381	11381	3906	3906	3906		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	46	46	46	16	16	16		
Working Flow (Mscfd) <sup>l</sup>	64	64	64	22	22	22		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	51	17

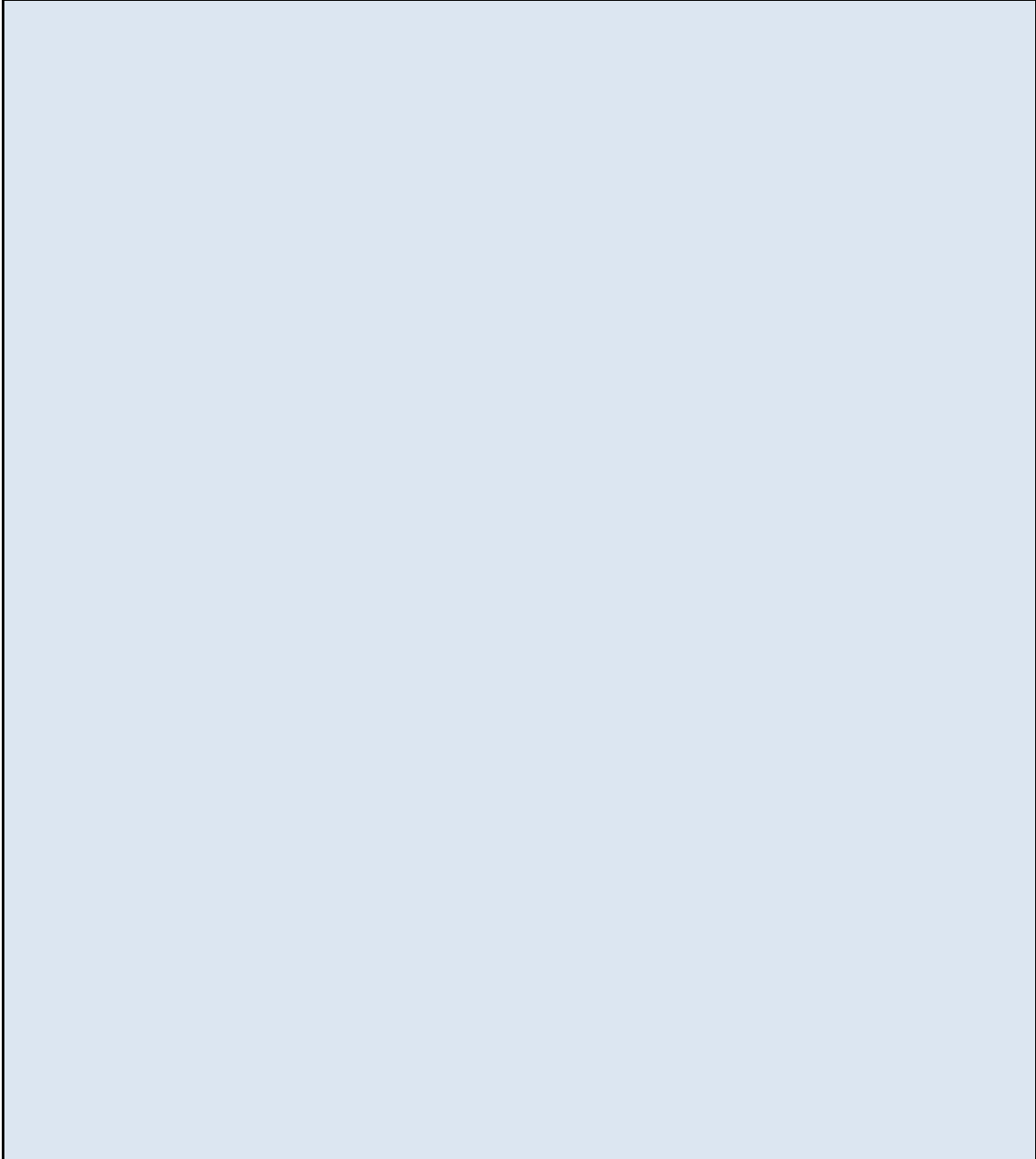
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,785	6,785
Oil Tank Working Rate	2,817	2,810
Water Tank Flash Rate	7,644	7,644
Water Tank Working Rate	10,729	10,729
Tank Breathing Rate	2,853	1,426
Truck Loading Vapor	2,527	2,527
Total	33,356	31,921

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHANDLER ST T3N-R64W-S15 L01**

Consent Decree Tank System Number: **2370**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01**

Consent Decree Tank System Number: **670**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_FINAL PACKET	.pdf	5/1/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	11/22/2016	STEM Engineering Evaluation Spreadsheet
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_SIGNED EVAL	.pdf	11/30/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_FINAL PACKET	.pdf	5/1/2018	Work Request
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_FINAL PACKET	.pdf	5/1/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_WALKDOWN	.pdf	11/30/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_1732_NORMAL	.mp4	11/21/2016	IR Camera Video Normal Operations
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_1733_DUMP	.mp4	11/21/2016	IR Camera Video During Dump Event
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_1734_POST	.mp4	11/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01_SIGNED EVAL	.pdf	11/30/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01**

Consent Decree Tank System Number: **670**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>8,781</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>16,467</b>	<b>16,467</b>	
Total VCS Capacity (scfh)	<b>20,522</b>	<b>21,067</b>	
VCS Capacity minus PPIVF (scfh)	<b>11,743</b>	<b>12,286</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/25/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01**

Consent Decree Tank System Number: **670**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>8,781</b>	<b>8,779</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHENOWETH JOHNSON BALBOA T4N-R64W-S20 L01**

Consent Decree Tank System Number: **670**

**Audit Notes**

The stem work request (PG 6 of Final Packet pdf) stated to modify the oil fill line on top of tanks, as necessary, to ensure HLP #1 can produce to oil tank #3 however nowhere in the jobsheets (PGs 26-30 of Final Packet pdf) does it verify this task was completed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01**

Consent Decree Tank System Number: **657**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_FINAL PACKET	.pdf	11/20/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_STEM Evalrev1	.xlsm	5/2/2016	STEM Engineering Evaluation Spreadsheet
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_FINAL PACKET	.pdf	11/25/2015	Work Request
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_FINAL PACKET	.pdf	3/7/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_WALKDOWN	.pdf	4/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_IR VERIFI	.pdf	4/27/2016	IR Verification Field Data Sheet
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_0909_NORMAL	.mp4	4/26/2016	IR Camera Video Normal Operations
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_0910_DUMP	.mp4	4/26/2016	IR Camera Video During Dump Event
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_0911_POST	.mp4	4/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01

**Consent Decree Tank System Number:** 657

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	TEC 4-CS (48" Tornado)			
Number of Units	1			
Man. Capacity (MSCFD)	110.4			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,508	4,509	0%
Calculated Burner Capacity (scfh)	4,181	4,600	
Headspace Surge Capacity (scfh)	2,394	2,394	
Total VCS Capacity (scfh)	6,575	6,994	
VCS Capacity minus PPIVF (scfh)	2,067	2,485	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 1/2/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01**

Consent Decree Tank System Number: **657**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHENOWETH LEONARD HANDSCOME T4N-R64W-S21 L01**

Consent Decree Tank System Number: **657**

**Audit Notes**

There is no indication on the Job Sheet, Page 31 of the Final Packet, or any other provided documentation that the Tank VOC line was upgraded to 3" line from the existing 2" line. This was requested in the Work Request Form, Page 3 of the Final Packet. A data request from Noble on 8/14/2018 stated that on or around 3/14/2016 field verification confirmed 3" line was installed from the tanks to the knockout drum.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHITTENDEN T5N-R64W-32 L01**

Consent Decree Tank System Number: **2269**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
CHITTENDEN T5N-R64W-32 L01_FINAL PACKET	.pdf	5/17/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
CHITTENDEN T5N-R64W-32 L01_STEM Engineering Evaluation_rev1	.xlsm	1/17/2017	STEM Engineering Evaluation Spreadsheet
CHITTENDEN T5N-R64W-32 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
CHITTENDEN T5N-R64W-32 L01_FINAL PACKET	.pdf	10/4/2016	Work Request
CHITTENDEN T5N-R64W-32 L01_FINAL PACKET	.pdf	12/2/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
CHITTENDEN T5N-R64W-32 L01_WALKDOWN	.pdf	1/17/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
CHITTENDEN T5N-R64W-32 L01_IR VERIFICATION	.pdf	1/16/2017	IR Verification Field Data Sheet
CHITTENDEN T5N-R64W-32 L01_0034_NORMAL	.mp4	1/16/2017	IR Camera Video Normal Operations
CHITTENDEN T5N-R64W-32 L01_0035_DUMP	.mp4	1/16/2017	IR Camera Video During Dump Event
CHITTENDEN T5N-R64W-32 L01_0036_POST	.mp4	1/16/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
CHITTENDEN T5N-R64W-32 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHITTENDEN T5N-R64W-32 L01**

Consent Decree Tank System Number: **2269**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,204</b>	<b>2,325</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>3,953</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,953</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,749</b>	<b>2,633</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 12/22/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 4/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHITTENDEN T5N-R64W-32 L01**

Consent Decree Tank System Number: **2269**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>440</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>45.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,913</b>	<b>1,802</b>
Oil Tank Working Rate	<b>174</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,325</b>	<b>2,204</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHITTENDEN T5N-R64W-32 L01**

Consent Decree Tank System Number: **2269**

**Audit Notes**

-The Work Request indicated the oil dump valve on the separator was to be modified to Kimray 1400 with 3/8 inch trim. Could not verify the oil dump valve size (2" or 1") on either separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 3/8" trim.

-Engineering Evaluation states the oil/condensate tank is kept at 90% using "Equalizer Height". There is no equalizer line in this case because the Tank Battery contains only one tank. The headspace surge capacity is dependent on the fill level. No headspace surge capacity was claimed for this facility therefore the Engineering Design Standard is still considered to be applied correctly.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHRISTENSEN T5N-R63W-S18 L01**

Consent Decree Tank System Number: **2117**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
CHRISTENSEN T5N-R63W-S18 L01_FINAL PACKET	.pdf	7/5/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
CHRISTENSEN T5N-R63W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	7/22/2016	STEM Engineering Evaluation Spreadsheet
CHRISTENSEN T5N-R63W-S18 L01_Final Signed STEM Plan	.pdf	10/19/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
CHRISTENSEN T5N-R63W-S18 L01_FINAL PACKET	.pdf	7/5/2016	Work Request
CHRISTENSEN T5N-R63W-S18 L01_FINAL PACKET	.pdf	7/5/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
CHRISTENSEN T5N-R63W-S18 L01_WALKDOWN	.pdf	7/5/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
CHRISTENSEN T5N-R63W-S18 L01_IR VERIFICATION	.pdf	7/1/2016	IR Verification Field Data Sheet
CHRISTENSEN T5N-R63W-S18 L01_1227_NORMAL	.mp4	6/30/2016	IR Camera Video Normal Operations
CHRISTENSEN T5N-R63W-S18 L01_1228_DUMP	.mp4	6/30/2016	IR Camera Video During Dump Event
CHRISTENSEN T5N-R63W-S18 L01_1229_POST	.mp4	6/30/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
CHRISTENSEN T5N-R63W-S18 L01_SIGNED EVAL	.pdf	7/26/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** CHRISTENSEN T5N-R63W-S18 L01

**Consent Decree Tank System Number:** 2117

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,068	3,069	0%
Calculated Burner Capacity (scfh)	2,938	5,833	
Headspace Surge Capacity (scfh)	784	784	
Total VCS Capacity (scfh)	3,722	6,617	
VCS Capacity minus PPIVF (scfh)	654	3,548	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 3/28/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/28/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHRISTENSEN T5N-R63W-S18 L01**

Consent Decree Tank System Number: **2117**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CHRISTENSEN T5N-R63W-S18 L01**

Consent Decree Tank System Number: **2117**

**Audit Notes**

The walkdown checklist is not marked complete.

The stem work request form (PG 3 of FINAL PACKET pdf) states the pneumatic pssh was to be set to shut in HP HI/LO @ 55 psig in the LP separator; however, nowhere in the job sheets (PGs 20 through 27 of FINAL PACKET pdf) does it confirm this task was completed.

CB - The "Yes" response to Item B3 of the STEM Retrofit Walkdown Checklist (pg 6/29) will be used as confirmation that the PSHH was set to 55 psig in the LP separator.

No further information is required for this audit.

This site was an alternate site selected for IR Camera Inspection based upon its system pressure group ( $\geq 233$ ).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CLEMENT T4N-R66W-S11 L01**

Consent Decree Tank System Number: **2327**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CLEMENT T4N-R66W-S11 L01_FINAL PACKET	.pdf	1/16/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CLEMENT T4N-R66W-S11 L01_STEM Engineering Evaluation_rev1	.xlsm	1/16/2017	STEM Engineering Evaluation Spreadsheet
CLEMENT T4N-R66W-S11 L01_SIGNED EVAL	.pdf	1/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CLEMENT T4N-R66W-S11 L01_FINAL PACKET	.pdf	1/16/2017	Work Request
CLEMENT T4N-R66W-S11 L01_FINAL PACKET	.pdf	1/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CLEMENT T4N-R66W-S11 L01_WALKDOWN	.pdf	1/11/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CLEMENT T4N-R66W-S11 L01_IR VERIFICATION	.pdf	1/11/2017	IR Verification Field Data Sheet
CLEMENT T4N-R66W-S11 L01_0008_NORMAL	.mp4	1/11/2017	IR Camera Video Normal Operations
CLEMENT T4N-R66W-S11 L01_0009_DUMP	.mp4	1/11/2017	IR Camera Video During Dump Event
CLEMENT T4N-R66W-S11 L01_0010_POST	.mp4	1/11/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CLEMENT T4N-R66W-S11 L01_SIGNED EVAL	.pdf	1/16/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CLEMENT T4N-R66W-S11 L01**

Consent Decree Tank System Number: **2327**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,840</b>	<b>3,841</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>2,903</b>	<b>2,903</b>	
Total VCS Capacity (scfh)	<b>6,901</b>	<b>7,861</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,061</b>	<b>4,020</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 12/15/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 1/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CLEMENT T4N-R66W-S11 L01**

Consent Decree Tank System Number: **2327**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>317</b>	<b>0</b>
Mscfd	<b>15</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>634</b>	<b>634</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,841</b>	<b>3,840</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CLEMENT T4N-R66W-S11 L01**

Consent Decree Tank System Number: **2327**

**Audit Notes**

**1. Facility walkdown inconsistencies**

The Signed Walkdown (Final Packet, pg 30) indicates the tanks are banked onsite and includes the comment "one bank including two tanks". This appears to be a misunderstanding of "tank banking".

Item C8 of the Walkdown Checklist (Final Packet, pg 29) indicates multiple LP oil dumps tie into a single tank fill line. According to the STEM Work Request (Final Packet, pg 3) and the Job Sheet (Final Packet, pg 22) only a single LP oil dump is connected to the tank fill line.

Due to these multiple inconsistencies in the Facility Walkdown Checklist, the checklist has been omitted as a verification source.

**2. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 11-16) are not dated. Assumed the date is the same as Facility Scouting date (3/4/2016).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CLEMONS T4N-R64W-S15 L02**

Consent Decree Tank System Number: **663/727**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_FINAL PACKET	.pdf	3/27/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_STEM Engineering Evaluation_rev1_with TLO	.xlsm	10/27/2017	STEM Engineering Evaluation Spreadsheet
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_SIGNED EVAL	.pdf	10/27/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_FINAL PACKET	.pdf	3/27/2018	Work Request
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_FINAL PACKET	.pdf	3/27/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_WALKDOWN	.pdf	5/5/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_IR VERIFICATION	.pdf	5/5/2016	IR Verification Field Data Sheet
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_0946_NORMAL	.mp4	5/5/2016	IR Camera Video Normal Operations
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_0947_DUMP	.mp4	5/5/2016	IR Camera Video During Dump Event
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_0948_POST	.mp4	5/5/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
STOCKLEY T4N-R64W-S15 L01 & CLEMONS T4N-R64W-S15 L02_SIGNED EVAL	.pdf	10/27/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CLEMONS T4N-R64W-S15 L02**

Consent Decree Tank System Number: **663/727**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>7</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>	<b>60</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 1/2"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>19,038</b>	<b>19,184</b>	<b>1%</b>
Calculated Burner Capacity (scfh)	<b>5,811</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>51,913</b>	<b>52,549</b>	
Total VCS Capacity (scfh)	<b>57,724</b>	<b>64,216</b>	
VCS Capacity minus PPIVF (scfh)	<b>38,686</b>	<b>45,032</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 6/7/2018  
 Audit Document Review Verified by: \_\_\_\_\_ Patrick Dilsaver  
 Audit Document Verification Date: \_\_\_\_\_ 12/14/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CLEMONS T4N-R64W-S15 L02**

Consent Decree Tank System Number: **663/727**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61	0.61					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	0.72	0.72	0.72					
Gas/Oil Ratio (scf/bbl)	96.4	96.4	96.4					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.80	0.80	0.78					
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20	12.20	7.20					
Critical Pressure (psia) <sup>b</sup>	530	530	530					
Vapor Pressure (psia) <sup>c</sup>	73	73	73					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86	0.86					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	1320	1320	759					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	127.2	127.2	73.2					
Working Flow (Mscfd) <sup>h,i</sup>	13	13	7					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	40	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	13,646	13,516
Oil Tank Working Rate	1,347	1,331
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,664	1,664
Truck Loading Vapor	2,527	2,527
Total	19,184	19,038

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CLEMONS T4N-R64W-S15 L02**

Consent Decree Tank System Number: **663/727**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Field Datasheet (Final Packet, pg 17) shows the separators onsite all originally had a 2" oil dump valve with a 1" trim size. The Engineering Evaluation shows the (2) LP separators onsite to currently have 2" oil dump valves with 3/4" trim and the (1) HLP separator onsite to have a 1" oil dump valve with 1/2" trim.

ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg7) is checked "yes" indicating the oil dump trims onsite are consistent with the trim sizes used in the Engineering Evaluation.

A 1" oil dump valve is used in the Engineering Evaluation for the HLP separator onsite, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the modeling guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

2" oil dump valves are used in the Engineering Evaluation for the (2) LP separators onsite. Field datasheets (Final Packet, pg 17) show that 2" oil dump valves previously existed on those separators. No documentation is provided indicating these oil dump valves were ever modified with different size valves, therefore it was assumed 2" oil dump valves are currently installed on the (2) LP separators onsite.

**Vapor Surge Vessels**

Noble confirmed via a data request received on 12/10/2018 that the field verification for this facility was completed on or around 4/8/2016 and it confirmed that two (2) tanks were converted to vapor surge vessels.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01\_**

**Consent Decree Tank System Number:** **236**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_FINAL PACKET_REWORK	.pdf	9/1/2017	Rework Pre-Evaluation Facility Inspection
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_FINAL PACKET	.pdf	11/4/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_STEM Engineer Eval_rev1_Oil	.xlsm	12/16/2016	STEM Engineering Evaluation Spreadsheet
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_SIGNED EVAL	.pdf	12/19/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_FINAL PACKET_REWORK	.pdf	9/1/2017	Rework Request
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_FINAL PACKET_REWORK	.pdf	9/1/2017	Rework Construction Jobsheets
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_FINAL PACKET	.pdf	11/4/2015	Work Request
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_FINAL PACKET	.pdf	11/4/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_WALKDOWN	.pdf	9/1/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_IR VERIFICATION	.pdf	7/27/2016	IR Verification Field Data Sheet
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_1336_NORMAL	.mp4	7/26/2016	IR Camera Video Normal Operations
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_1337_DUMP	.mp4	7/26/2016	IR Camera Video During Dump Event
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_1338_POST	.mp4	7/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01_SIGNED EVAL	.pdf	12/19/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01\_**

**Consent Decree Tank System Number:** **236**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>12</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>4 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>	<b>2" &amp; 2"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>107,637</b>	<b>110,092</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>5,766</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>457,935</b>	<b>457,935</b>	
Total VCS Capacity (scfh)	<b>463,701</b>	<b>469,602</b>	
VCS Capacity minus PPIVF (scfh)	<b>356,064</b>	<b>359,509</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 1/4/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/19/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01\_**

Consent Decree Tank System Number: **236**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02
Z2	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86
Z3	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Z	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.76	0.76	0.77	0.77	0.77	0.77	0.77	0.77
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	57.00	57.00	21.25	21.25	21.25	21.25	21.25	21.25
Critical Pressure (psia) <sup>b</sup>	833	833	833	833	833	833	833	833
Vapor Pressure (psia) <sup>c</sup>	407	407	407	407	407	407	407	407
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak Flow (bopd) <sup>f,g</sup>	18282	18282	6905	6905	6905	6905	6905	6905

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	418.7	418.7	158.2	158.2	158.2	158.2	158.2	158.2
Working Flow (Mscfd) <sup>h,i</sup>	174	174	66	66	66	66	66	66

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	
scfh vapor/tank <sup>i</sup>	396	
Mscfd	114	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	74,431	74,431
Oil Tank Working Rate	30,906	30,829
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	4,755	2,377
Truck Loading Vapor	0	0
<b>Total</b>	<b>110,092</b>	<b>107,637</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: COALVIEW DINNER G01 ECONODE T4N-R65W-S1 L01\_

Consent Decree Tank System Number: 236

**Audit Notes**

The walkdown checklist was not marked as complete. Completion was verified through other documentation in the final packet.

The field data sheet (Final Packet Rework pg. 11) lists 14 oil tanks on site. The signed eval only lists 12. Additional data was provided by Noble as follows confirming there are only 12 oil tanks onsite, "An engineering review of this facility was completed on or around 7/12/2018, this review confirmed that there are 12 producing tanks that are associated with the oil VOC system. Additionally, there is one maintenance tank and one tank that was associated with a vertical well. That tank is no longer a producing tank and is not part of the oil VOC system."

It was assumed that the "Maintenance Tank" in the IR videos is not connected to the VCS. This site was selected to be re-filmed to confirm this assumption and to get another look at the VOC lines from the KO to the burner.

The facility has two banks of 6 oil tanks each. Working losses from the non-producing bank were not accounted for in the Signed Evaluation. Therefore, the Modeling Guideline was not strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CODY WHITE GUTTERSEN T3N-R64W-S3 L01**

Consent Decree Tank System Number: **521**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_FINAL PACKET	.pdf	8/29/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	9/1/2017	STEM Engineering Evaluation Spreadsheet
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_SIGNED EVAL	.pdf	9/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_FINAL PACKET	.pdf	8/29/2017	Work Request
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_FINAL PACKET	.pdf	8/29/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_WALKDOWN	.pdf	8/29/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_IR VERIFICATION	.pdf	8/29/2017	IR Verification Field Data Sheet
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_4705_NORMAL	.mp4	8/25/2017	IR Camera Video Normal Operations
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_4706_DUMP	.mp4	8/25/2017	IR Camera Video During Dump Event
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_4707_POST	.mp4	8/25/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CODY WHITE GUTTERSEN T3N-R64W-S3 L01_SIGNED EVAL	.pdf	9/12/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CODY WHITE GUTTERSEN T3N-R64W-S3 L01**

**Consent Decree Tank System Number:** **521**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>20,184</b>	<b>20,184</b>	
Total VCS Capacity (scfh)	<b>24,273</b>	<b>24,784</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,765</b>	<b>20,095</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/21/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CODY WHITE GUTTERSEN T3N-R64W-S3 L01**

Consent Decree Tank System Number: **521**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CODY WHITE GUTTERSEN T3N-R64W-S3 L01**

Consent Decree Tank System Number: **521**

**Audit Notes**

The walkdown checklist (CODY WHITE GUTTERSEN T3N-R64W-S3 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (CODY WHITE GUTTERSEN T3N-R64W-S3 L01\_FINAL PACKET).

The Field Datasheet (CODY WHITE GUTTERSEN T3N-R64W-S3 L01\_FINAL PACKET, p 16) confirms Sep #3 has a 2" 212 SMA valve. The job sheet (CODY WHITE GUTTERSEN T3N-R64W-S3 L01\_FINAL PACKET, p 32) confirms that the valve trim was changed. The 212 SMA valve had to be swapped out for a different valve to accommodate the smaller trim size. There is no confirmation that the new valve is a 1400 as requested in the work order. It is unknown in this case if the modeling guideline was strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLEMAN HERBST T4N-R64W-S22 L01**

Consent Decree Tank System Number: **474**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
COLEMAN HERBST T4N-R64W-S22 L01_FINAL PACKET	.pdf	1/26/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
COLEMAN HERBST T4N-R64W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	1/30/2017	STEM Engineering Evaluation Spreadsheet
COLEMAN HERBST T4N-R64W-S22 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
COLEMAN HERBST T4N-R64W-S22 L01_FINAL PACKET	.pdf	1/26/2017	Work Request
COLEMAN HERBST T4N-R64W-S22 L01_FINAL PACKET	.pdf	1/26/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
COLEMAN HERBST T4N-R64W-S22 L01_WALKDOWN	.pdf	1/26/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
COLEMAN HERBST T4N-R64W-S22 L01_IR VERIFICATION	.pdf	1/24/2017	IR Verification Field Data Sheet
COLEMAN HERBST T4N-R64W-S22 L01_NORMAL	.mp4	1/18/2017	IR Camera Video Normal Operations
COLEMAN HERBST T4N-R64W-S22 L01_DUMP	.mp4	1/18/2017	IR Camera Video During Dump Event
COLEMAN HERBST T4N-R64W-S22 L01_POST	.mp4	1/18/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
COLEMAN HERBST T4N-R64W-S22 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLEMAN HERBST T4N-R64W-S22 L01**

Consent Decree Tank System Number: **474**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,820</b>	<b>13,822</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>32,454</b>	<b>32,454</b>	
Total VCS Capacity (scfh)	<b>36,509</b>	<b>37,054</b>	
VCS Capacity minus PPIVF (scfh)	<b>22,689</b>	<b>23,232</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Jesse Hanshaw  
 Audit Document Review Date: 12/10/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 4/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLEMAN HERBST T4N-R64W-S22 L01**

Consent Decree Tank System Number: **474**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.50</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.61</b>							
Gas/Oil Ratio (scf/bbl)	<b>256.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>601</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>153</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1184</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>303.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>11</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>12,639</b>	<b>12,639</b>
Oil Tank Working Rate	<b>469</b>	<b>468</b>
Water Tank Flash Rate	<b>0</b>	
Water Tank Working Rate	<b>0</b>	
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

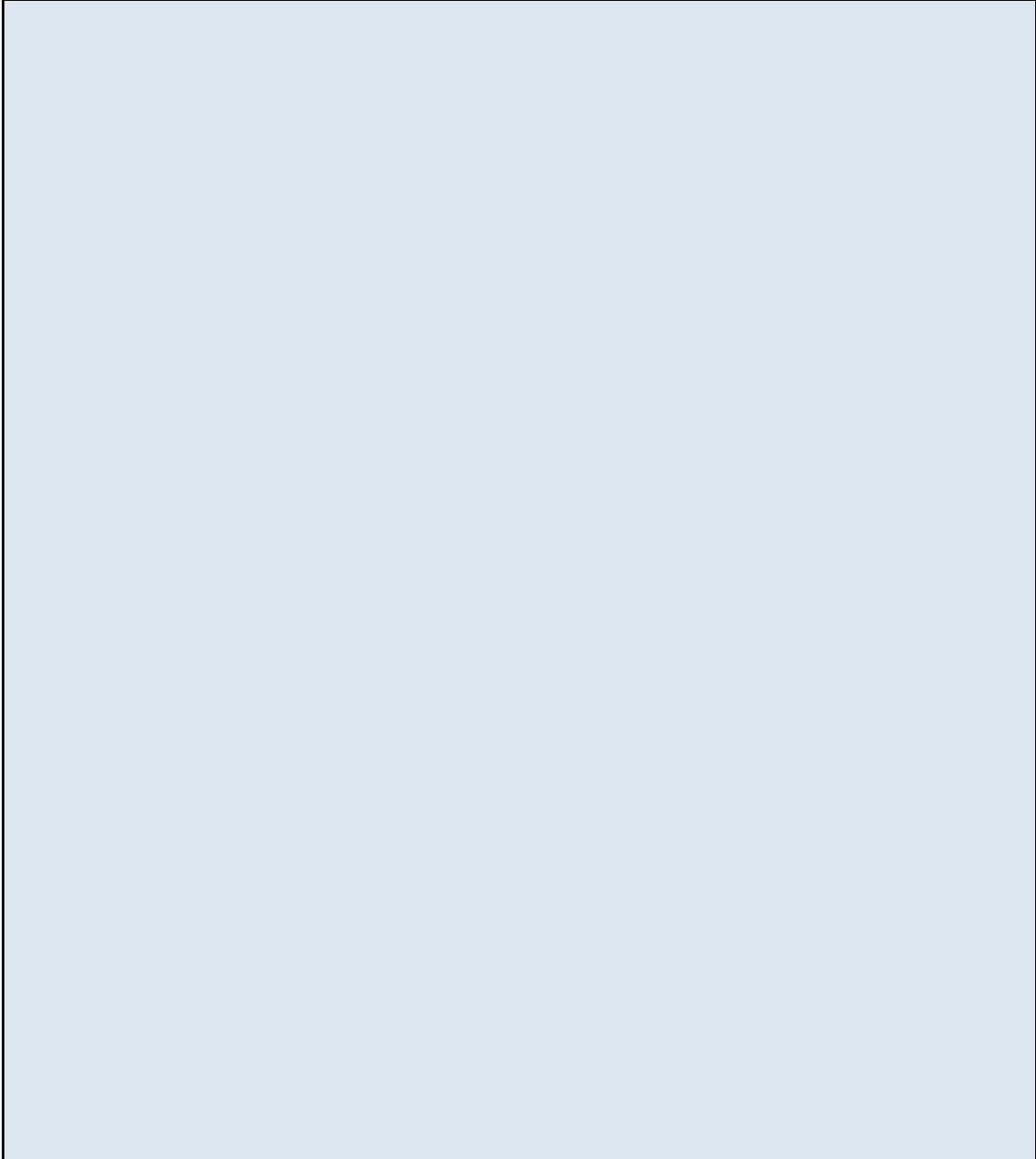
Total	13,822	13,820
-------	--------	--------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLEMAN HERBST T4N-R64W-S22 L01**

Consent Decree Tank System Number: **474**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLEMAN VOLKENS LANG T4N-R64W-S22 L01**

Consent Decree Tank System Number: **481**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_FINAL PACKET	.pdf	2/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	12/20/2016	STEM Engineering Evaluation Spreadsheet
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_SIGNED EVAL	.pdf	1/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_FINAL PACKET	.pdf	2/29/2016	Work Request
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_FINAL PACKET	.pdf	2/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_WALKDOWN	.pdf	2/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_0729_NORMAL	.mp4	2/24/2016	IR Camera Video Normal Operations
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_0730_DUMP	.mp4	2/24/2016	IR Camera Video During Dump Event
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_0731_POST	.mp4	2/24/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
COLEMAN VOLKENS LANG T4N-R64W-S22 L01_SIGNED EVAL	.pdf	1/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLEMAN VOLKENS LANG T4N-R64W-S22 L01**

Consent Decree Tank System Number: **481**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,575</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,583</b>	<b>21,583</b>	
Total VCS Capacity (scfh)	<b>24,158</b>	<b>27,416</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,174</b>	<b>22,432</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/14/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLEMAN VOLKENS LANG T4N-R64W-S22 L01**

Consent Decree Tank System Number: **481**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	23	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLEMAN VOLKENS LANG T4N-R64W-S22 L01**

Consent Decree Tank System Number: **481**

**Audit Notes**

The stem work request (PG 3 of Final Packet pdf) states to disconnect and bottom out 1 tank from fill header but leave connected to the VOC header to be used as a headspace tank however nowhere in the job sheets (PGs 21-24 of Final Packet pdf) does it state this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 9/20/2018, field verification confirmed that one tank was converted to a headspace tank."



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLTRANE IGO FARMS T5N-R66W-S28 L01**

Consent Decree Tank System Number: **32**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
COLTRANE IGO FARMS T5N-R66W-S28 L01_FINAL PACKET	.pdf	10/27/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
COLTRANE IGO FARMS T5N-R66W-S28 L01_STEM Engineering Eval_rev1	.xlsm	3/20/2017	STEM Engineering Evaluation Spreadsheet
EVAL	.pdf	3/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
COLTRANE IGO FARMS T5N-R66W-S28 L01_FINAL PACKET	.pdf	10/27/2017	Work Request
COLTRANE IGO FARMS T5N-R66W-S28 L01_FINAL PACKET	.pdf	10/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
COLTRANE IGO FARMS T5N-R66W-S28 L01_WALKDOWN	.pdf	3/9/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
COLTRANE IGO FARMS T5N-R66W-S28 L01_IR VERIFICATION	.pdf	3/9/2017	IR Verification Field Data Sheet
COLTRANE IGO FARMS T5N-R66W-S28 L01_1843_NORMAL	.mp4	3/8/2017	IR Camera Video Normal Operations
COLTRANE IGO FARMS T5N-R66W-S28 L01_1844_DUMP	.mp4	3/8/2017	IR Camera Video During Dump Event
COLTRANE IGO FARMS T5N-R66W-S28 L01_1845_POST	.mp4	3/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
COLTRANE IGO FARMS T5N-R66W-S28 L01_SIGNED EVAL	.pdf	3/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** COLTRANE IGO FARMS T5N-R66W-S28 L01

**Consent Decree Tank System Number:** 32

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	5
Oil Tank Capacity (bbl):	300
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	Cimarron 48 HV			
Number of Units	1			
Man. Capacity (MSCFD)	109.272			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	5,222	5,222	0%
Calculated Burner Capacity (scfh)	2,968	4,553	
Headspace Surge Capacity (scfh)	8,537	8,537	
Total VCS Capacity (scfh)	11,505	13,090	
VCS Capacity minus PPIVF (scfh)	6,283	7,868	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 12/12/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 12/27/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COLTRANE IGO FARMS T5N-R66W-S28 L01**

Consent Decree Tank System Number: **32**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>29</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>5,222</b>	<b>5,222</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: COLTRANE IGO FARMS T5N-R66W-S28 L01

Consent Decree Tank System Number: 32

**Audit Notes**

The walkdown checklist was not marked as complete. Completions were verified through other documentation in the final packet.

The site sketch (COLTRANE IGO FARMS T5N-R66W-S28 L01\_FINAL PACKET, p 11) shows 2 knockouts. The Signed eval (COLTRANE IGO FARMS T5N-R66W-S28 L01\_SIGNED EVAL, p 2) shows that there is only 1 header from the tank to the knockout. There was no documentation (FINAL PACKET, p 21) to remove the extra knockout. According to the field data sheet (COLTRANE IGO FARMS T5N-R66W-S28 L01\_FINAL PACKET, p 15) there are 2 NPS lines from the KO to burners at 120' & 210'. Therefore the Engineering Guideline was not followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONAGRA T5N-R64W-S30 L03**

Consent Decree Tank System Number: **321**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CONAGRA T5N-R64W-S30 L03_FINAL PACKET	.pdf	10/23/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CONAGRA T5N-R64W-S30 L03_STEM Engineering Evaluation_rev1	.xls	4/20/2016	STEM Engineering Evaluation Spreadsheet
CONAGRA T5N-R64W-S30 L03_Final Signed STEM Plan	.pdf	6/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CONAGRA T5N-R64W-S30 L03_FINAL PACKET	.pdf	10/23/2017	Work Request
CONAGRA T5N-R64W-S30 L03_FINAL PACKET	.pdf	10/23/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CONAGRA T5N-R64W-S30 L03_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CONAGRA T5N-R64W-S30 L03_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
CONAGRA T5N-R64W-S30 L03_0851_NORMAL	.mp4	4/13/2016	IR Camera Video Normal Operations
CONAGRA T5N-R64W-S30 L03_0852_DUMP	.mp4	4/13/2016	IR Camera Video During Dump Event
CONAGRA T5N-R64W-S30 L03_0853_POST	.mp4	4/13/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CONAGRA T5N-R64W-S30 L03_SIGNED EVAL	.pdf	4/20/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONAGRA T5N-R64W-S30 L03**

Consent Decree Tank System Number: **321**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>5,909</b>	<b>5,938</b>	
Total VCS Capacity (scfh)	<b>10,090</b>	<b>10,538</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,106</b>	<b>5,553</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 1/3/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/19/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONAGRA T5N-R64W-S30 L03**

Consent Decree Tank System Number: **321**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONAGRA T5N-R64W-S30 L03**

Consent Decree Tank System Number: **321**

**Audit Notes**

-The walkdown checklist was not marked complete  
-The signed eval shows two 4" lines from the knockout to the burner. But only one line was confirmed installed.  
This site was selected for IR Camera Inspection based upon the understanding that the engineering design standard was not met.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONNELL T4N-R64W-S4 L05**

Consent Decree Tank System Number: **1403**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CONNELL T4N-R64W-S4 L05_FINAL PACKET	.pdf	12/12/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CONNELL T4N-R64W-S4 L05_STEM Engineering Evaluation_rev1	.xls	12/12/2016	STEM Engineering Evaluation Spreadsheet
CONNELL T4N-R64W-S4 L05_SIGNED EVAL	.pdf	12/14/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CONNELL T4N-R64W-S4 L05_FINAL PACKET	.pdf	12/12/2016	Work Request
CONNELL T4N-R64W-S4 L05_FINAL PACKET	.pdf	12/12/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CONNELL T4N-R64W-S4 L05_WALKDOWN	.pdf	12/12/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CONNELL T4N-R64W-S4 L05_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
CONNELL T4N-R64W-S4 L05_1792_NORMAL	.mp4	12/7/2016	IR Camera Video Normal Operations
CONNELL T4N-R64W-S4 L05_1793_DUMP	.mp4	12/7/2016	IR Camera Video During Dump Event
CONNELL T4N-R64W-S4 L05_1794_POST	.mp4	12/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CONNELL T4N-R64W-S4 L05_SIGNED EVAL	.pdf	12/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONNELL T4N-R64W-S4 L05**

Consent Decree Tank System Number: **1403**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,878</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>589</b>	<b>589</b>	
Total VCS Capacity (scfh)	<b>4,467</b>	<b>5,142</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,023</b>	<b>1,697</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell

Audit Document Review Date: 6/14/2018

Audit Document Review Verified by: Chris Boggess

Audit Document Verification Date: 11/15/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONNELL T4N-R64W-S4 L05**

Consent Decree Tank System Number: **1403**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONNELL T4N-R64W-S4 L05**

Consent Decree Tank System Number: **1403**

**Audit Notes**

The stem work request (PG 4 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 22-26 of the Final Packet) does it confirm this task was completed

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 11/9/2016, field verification confirmed that the 3" VOC line from the tank to the KO pot was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONRAD HERBST BORYS T4N-R64W-S22 L01**

Consent Decree Tank System Number: **478**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CONRAD HERBST BORYS T4N-R64W-S22 L01_FINAL PACKET	.pdf	5/2/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CONRAD HERBST BORYS T4N-R64W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
CONRAD HERBST BORYS T4N-R64W-S22 L01_SIGNED EVAL	.pdf	5/3/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CONRAD HERBST BORYS T4N-R64W-S22 L01_FINAL PACKET	.pdf	5/2/2018	Work Request
CONRAD HERBST BORYS T4N-R64W-S22 L01_FINAL PACKET	.pdf	5/2/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CONRAD HERBST BORYS T4N-R64W-S22 L01_WALKDOWN	.pdf	4/27/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CONRAD HERBST BORYS T4N-R64W-S22 L01_IR VERIFICATION	.pdf	4/27/2016	IR Verification Field Data Sheet
CONRAD HERBST BORYS T4N-R64W-S22 L01_0925_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
CONRAD HERBST BORYS T4N-R64W-S22 L01_0926_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
CONRAD HERBST BORYS T4N-R64W-S22 L01_0927_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CONRAD HERBST BORYS T4N-R64W-S22 L01_SIGNED EVAL	.pdf	5/3/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CONRAD HERBST BORYS T4N-R64W-S22 L01**

**Consent Decree Tank System Number:** **478**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,846</b>	<b>1,846</b>	
Total VCS Capacity (scfh)	<b>5,398</b>	<b>6,446</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,717</b>	<b>2,763</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/18/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONRAD HERBST BORYS T4N-R64W-S22 L01**

Consent Decree Tank System Number: **478**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CONRAD HERBST BORYS T4N-R64W-S22 L01**

Consent Decree Tank System Number: **478**

**Audit Notes**

No comments, provided documentation is consistent with Modeling Guideline, Engineering Design Standard and itself.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COOK ST T9N-R58W-S36 L01**

Consent Decree Tank System Number: **2047**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
COOK ST T9N-R58W-S36 L01_FINAL PACKET	.pdf	4/6/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
COOK ST T9N-R58W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	4/9/2018	STEM Engineering Evaluation Spreadsheet
COOK ST T9N-R58W-S36 L01_SIGNED EVAL	.pdf	4/13/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
COOK ST T9N-R58W-S36 L01_FINAL PACKET	.pdf	4/6/2018	Work Request
COOK ST T9N-R58W-S36 L01_FINAL PACKET	.pdf	4/6/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
COOK ST T9N-R58W-S36 L01_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
COOK ST T9N-R58W-S36 L01_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
COOK ST T9N-R58W-S36 L01_0339_NORMAL	.mp4	4/13/2016	IR Camera Video Normal Operations
COOK ST T9N-R58W-S36 L01_0340_DUMP	.mp4	4/13/2016	IR Camera Video During Dump Event
COOK ST T9N-R58W-S36 L01_0341_POST	.mp4	4/13/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
COOK ST T9N-R58W-S36 L01_SIGNED EVAL	.pdf	4/13/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COOK ST T9N-R58W-S36 L01**

Consent Decree Tank System Number: **2047**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>170</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>170</b>	<b>170</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>65,437</b>	<b>65,441</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,856</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>134,712</b>	<b>134,712</b>	
Total VCS Capacity (scfh)	<b>140,568</b>	<b>145,098</b>	
VCS Capacity minus PPIVF (scfh)	<b>75,131</b>	<b>79,657</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/14/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/2/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COOK ST T9N-R58W-S36 L01**

Consent Decree Tank System Number: **2047**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.69							
Z2	-0.86							
Z3	0.98							
Z	1.80							
Gas/Oil Ratio (scf/bbl)	334.1							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	628							
Vapor Pressure (psia) <sup>c</sup>	183							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.81							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	4049							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	1352.5							
Working Flow (Mscfd) <sup>h,i</sup>	39							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	7560	7560						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	30	30						
Working Flow (Mscfd) <sup>l</sup>	42	42						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	29	6

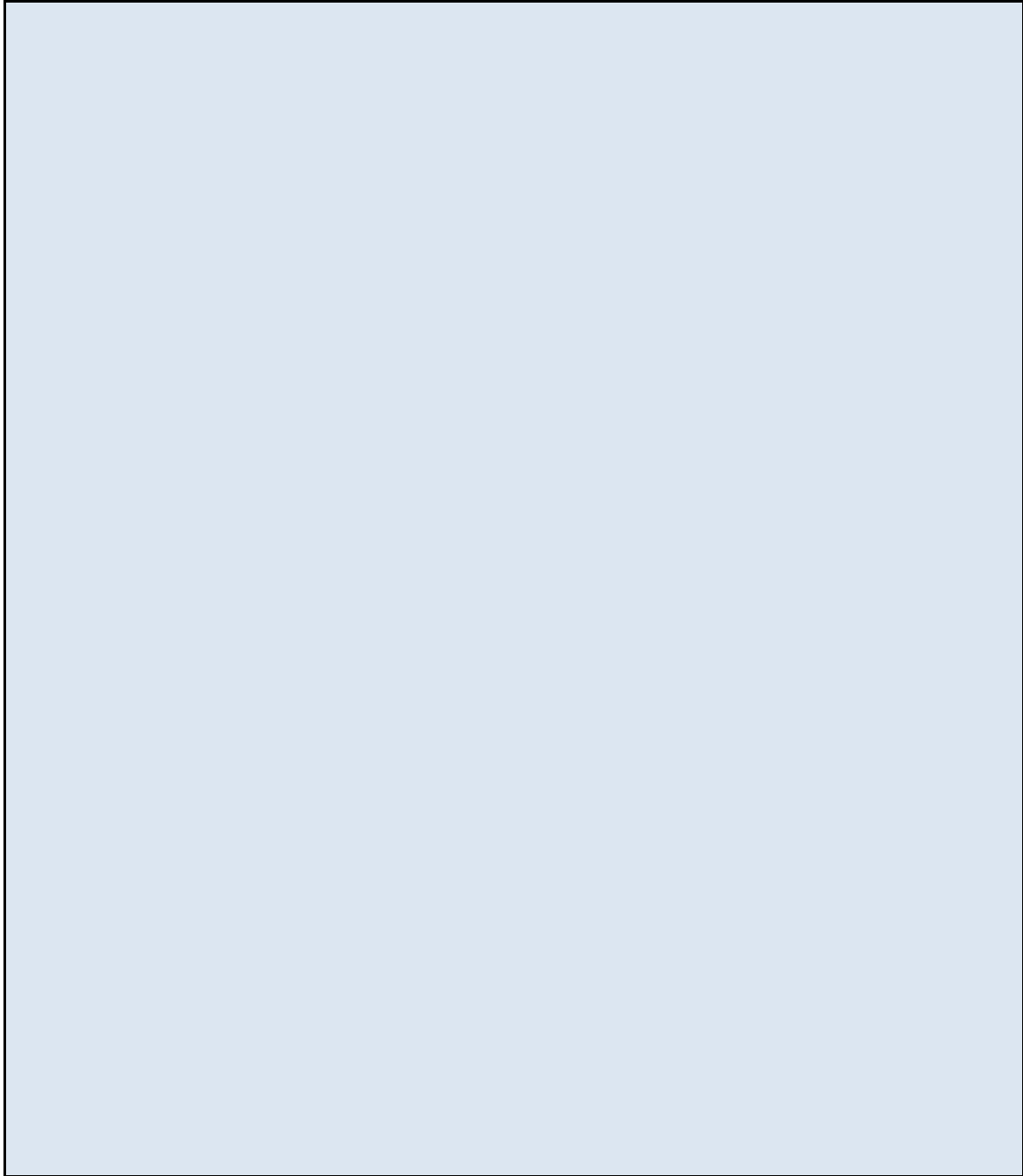
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	56,354	56,354
Oil Tank Working Rate	1,604	1,600
Water Tank Flash Rate	2,520	2,520
Water Tank Working Rate	3,537	3,537
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	0	0
Total	65,441	65,437

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **COOK ST T9N-R58W-S36 L01**

Consent Decree Tank System Number: **2047**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CORBIN RED T3N-R64W-S30 L01**

Consent Decree Tank System Number: **1055**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
CORBIN RED T3N-R64W-S30 L01_FINAL PACKET	.pdf	10/26/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
CORBIN RED T3N-R64W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	3/15/2015	STEM Engineering Evaluation Spreadsheet
CORBIN RED T3N-R64W-S30 L01_SIGNED EVAL	.pdf	6/14/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
CORBIN RED T3N-R64W-S30 L01_FINAL PACKET	.pdf	10/26/2015	Work Request
CORBIN RED T3N-R64W-S30 L01_FINAL PACKET	.pdf	10/26/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
CORBIN RED T3N-R64W-S30 L01_WALKDOWN	.pdf	10/21/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
CORBIN RED T3N-R64W-S30 L01_IR VERIFICATION	.pdf	10/21/2015	IR Verification Field Data Sheet
CORBIN RED T3N-R64W-S30 L01_0373_NORMAL	.mp4	10/21/2015	IR Camera Video Normal Operations
CORBIN RED T3N-R64W-S30 L01_0374_DUMP	.mp4	10/21/2015	IR Camera Video During Dump Event
CORBIN RED T3N-R64W-S30 L01_0375_POST	.mp4	10/21/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
CORBIN RED T3N-R64W-S30 L01_SIGNED EVAL	.pdf	6/14/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CORBIN RED T3N-R64W-S30 L01**

Consent Decree Tank System Number: **1055**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig) **n/a**

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,451</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,467</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>632</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>5,099</b>	<b>6,542</b>	
VCS Capacity minus PPIVF (scfh)	<b>828</b>	<b>2,091</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Nick Michaelson  
 Audit Document Review Date: 11/1/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CORBIN RED T3N-R64W-S30 L01**

Consent Decree Tank System Number: **1055**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>l</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,451</b>	<b>4,271</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CORBIN RED T3N-R64W-S30 L01**

Consent Decree Tank System Number: **1055**

**Audit Notes**

-The Job Sheets (Final Packet pg 20 & 22) indicate a new LP separator was installed onsite. Item A1 of the Walkdown Checklist (Final Packet pg 7) indicates the correct trim size (1/2") is installed on the LP separator, however, documentation is not provided indicating the size of the oil dump valve. The Signed Eval was run with a 1" valve size, which would underestimate PPIVFR if a 2" valve were installed.

-The fill level used in the Signed Eval is 90% with the control method indicated as "Equalizer Height". A single tank would not have an equalizer line. Zero headspace capacity was used in SLR's calculations based on a single tank being able to be filled up to 100% with liquid.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CORNELIUS T3N-R65W-S11 L01**

Consent Decree Tank System Number: **1772**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CORNELIUS T3N-R65W-S11 L01_FINAL PACKET	.pdf	12/5/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CORNELIUS T3N-R65W-S11 L01_STEM Engineering Evaluation_rev1	.xlsm	12/2/2016	STEM Engineering Evaluation Spreadsheet
CORNELIUS T3N-R65W-S11 L01_SIGNED EVAL	.pdf	12/2/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CORNELIUS T3N-R65W-S11 L01_FINAL PACKET	.pdf	12/5/2016	Work Request
CORNELIUS T3N-R65W-S11 L01_FINAL PACKET	.pdf	12/5/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CORNELIUS T3N-R65W-S11 L01_WALKDOWN	.pdf	11/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CORNELIUS T3N-R65W-S11 L01_IR VERIFICATION	.pdf	11/29/2016	IR Verification Field Data Sheet
CORNELIUS T3N-R65W-S11 L01_1759_NORMAL	.mp4	11/29/2016	IR Camera Video Normal Operations
CORNELIUS T3N-R65W-S11 L01_1760_DUMP	.mp4	11/29/2016	IR Camera Video During Dump Event
CORNELIUS T3N-R65W-S11 L01_1761_POST	.mp4	11/29/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CORNELIUS T3N-R65W-S11 L01_SIGNED EVAL	.pdf	12/2/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CORNELIUS T3N-R65W-S11 L01**

Consent Decree Tank System Number: **1772**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,283</b>	<b>2,283</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,812</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>400</b>	<b>400</b>	
Total VCS Capacity (scfh)	<b>3,212</b>	<b>6,233</b>	
VCS Capacity minus PPIVF (scfh)	<b>929</b>	<b>3,950</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CORNELIUS T3N-R65W-S11 L01**

Consent Decree Tank System Number: **1772**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.91							
Valve Coefficient (gpm/psi) ( $C_v$ )	3.22							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	414							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	43.2							
Working Flow (Mscfd) <sup>h,i</sup>	4							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	400	0
scfh vapor/tank <sup>i</sup>	317	0
Mscfd	8	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	1,802	1,802
Oil Tank Working Rate	164	164
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	317	317
Truck Loading Vapor	0	0
<b>Total</b>	<b>2,283</b>	<b>2,283</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: CORNELIUS T3N-R65W-S11 L01

Consent Decree Tank System Number: 1772

**Audit Notes**

**1. Field Datasheets are not dated and are largely unreadable**

The Field Datasheets (Final Packet, pg 12-17) are undated and unreadable. Date assumed to be same as Facility Scouting Date (6/3/2016).

**2. Field Datasheets Oil Tank Size - Unreadable**

Field datasheets (Final Packet, pg 12-17) are mostly unreadable. The number and size of oil tanks cannot be confirmed via the field datasheets. Based on the provided satellite photo (Final Packet, pg 20) and the IR Camera videos, SLR is able to confirm there is (1) 400 bbl oil tank onsite.

**3. Field Datasheets VOC Line Tanks to KO - Unreadable**

Field datasheets (Final Packet, pg 12-17) are mostly unreadable. The tank to KO VOC line size cannot be confirmed as 2" via the field datasheets. No other documentation is provided to confirm this line size. However, a 2" line size is consistent with the worst-case (i.e., smallest) line size in use.

**4. Tank Design & Engineering Controls - Tank Liquid Level**

The tank system consists of a single oil tank. The signed eval states that the certification maximum is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01**

Consent Decree Tank System Number: **311**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_FINAL PACKET	.pdf	1/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_STEM Engineering Evaluation _rev1	.xlsm	6/27/2017	STEM Engineering Evaluation Spreadsheet
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_SIGNED EVAL	.pdf	7/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_FINAL PACKET	.pdf	1/11/2016	Work Request
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_FINAL PACKET	.pdf	1/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_FINAL PACKET	.pdf	1/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_IR VERIFICATION	.pdf	1/8/2016	IR Verification Field Data Sheet
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_0094_NORMAL	.mp4	1/7/2016	IR Camera Video Normal Operations
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_0095_DUMP	.mp4	1/7/2016	IR Camera Video During Dump Event
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_0096_POST	.mp4	1/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01_SIGNED EVAL	.pdf	7/12/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01**

**Consent Decree Tank System Number:** **311**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,320</b>	<b>4,321</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,370</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>4,191</b>	<b>4,191</b>	
Total VCS Capacity (scfh)	<b>7,561</b>	<b>8,791</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,241</b>	<b>4,470</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/20/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01**

Consent Decree Tank System Number: **311**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

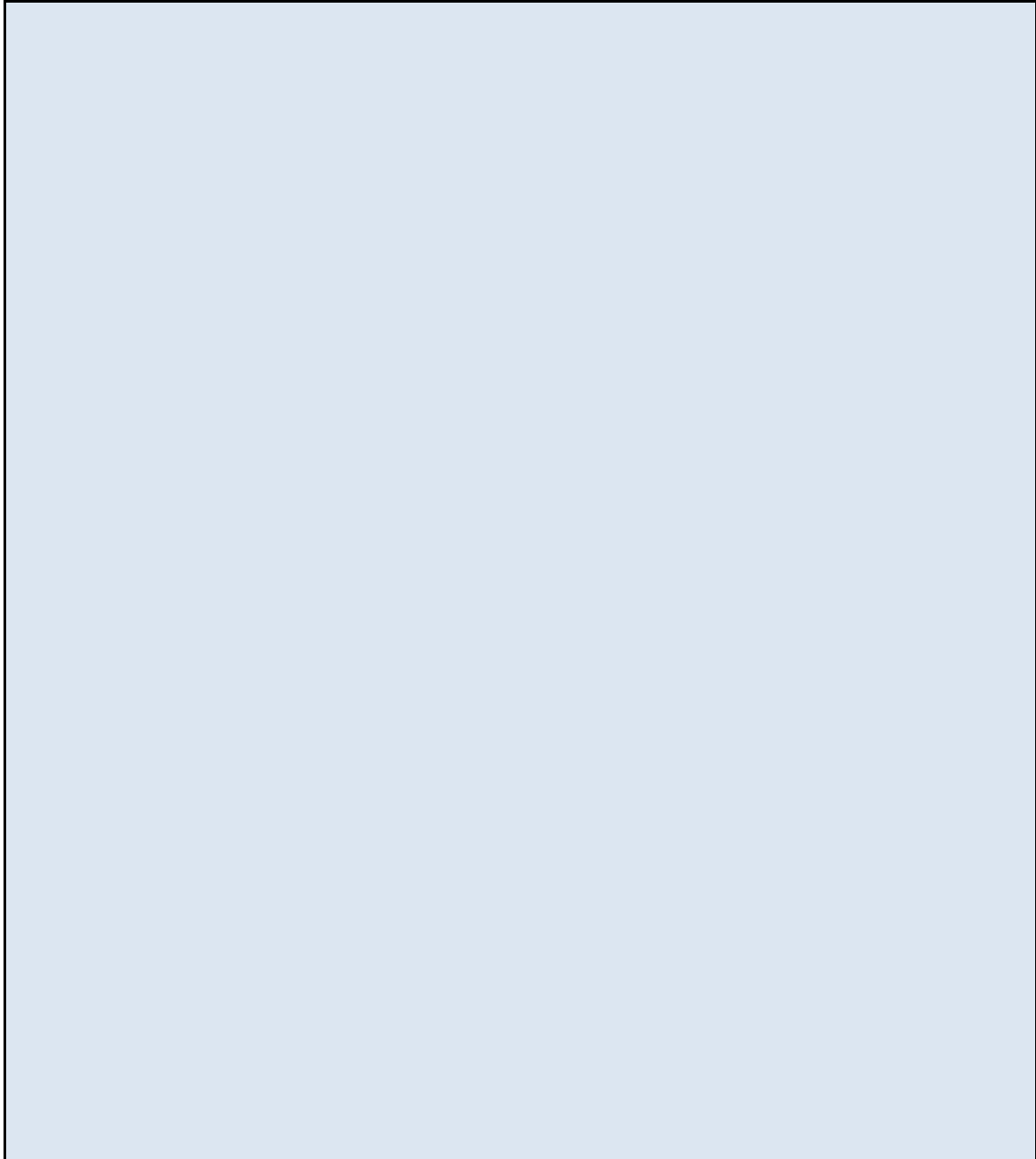
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,321</b>	<b>4,320</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CPC FERGUSON CHEWY UPRC T5N-R64W-S23 L01**

Consent Decree Tank System Number: **311**

**Audit Notes**





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN EVANS MURRY T4N-R65W-S17 L01**

Consent Decree Tank System Number: **137**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CRAVEN EVANS MURRY T4N-R65W-S17 L01_FINAL PACKET	.pdf	11/17/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN EVANS MURRY T4N-R65W-S17 L01_STEM Engineering Evaluation_rev1	.xlsm	11/16/2016	STEM Engineering Evaluation Spreadsheet
CRAVEN EVANS MURRY T4N-R65W-S17 L01_Final Signed STEM Plan	.pdf	1/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN EVANS MURRY T4N-R65W-S17 L01_FINAL PACKET	.pdf	11/17/2016	Work Request
CRAVEN EVANS MURRY T4N-R65W-S17 L01_FINAL PACKET	.pdf	11/17/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN EVANS MURRY T4N-R65W-S17 L01_WALKDOWN pg 4	.pdf	11/17/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN EVANS MURRY T4N-R65W-S17 L01_IR VERIFICATION	.pdf	11/16/2016	IR Verification Field Data Sheet
CRAVEN EVANS MURRY T4N-R65W-S17 L01_1715_NORMAL	.mp4	11/15/2016	IR Camera Video Normal Operations
CRAVEN EVANS MURRY T4N-R65W-S17 L01_1716_DUMP	.mp4	11/15/2016	IR Camera Video During Dump Event
CRAVEN EVANS MURRY T4N-R65W-S17 L01_1717_POST	.mp4	11/15/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN EVANS MURRY T4N-R65W-S17 L01_Final Signed STEM Plan	.pdf	1/23/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:**  **CRAVEN EVANS MURRY T4N-R65W-S17 L01**

**Consent Decree Tank System Number:**  **137**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,852</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,845</b>	<b>2,845</b>	
Total VCS Capacity (scfh)	<b>6,697</b>	<b>7,445</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,189</b>	<b>2,936</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:  Rachel Acker  
 Audit Document Review Date:  11/9/2017  
 Audit Document Review Verified by:  Chris Driscoll  
 Audit Document Verification Date:  11/15/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN EVANS MURRY T4N-R65W-S17 L01**

Consent Decree Tank System Number: **137**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN EVANS MURRY T4N-R65W-S17 L01**

Consent Decree Tank System Number: **137**

**Audit Notes**

The walkdown checklist was not marked as complete. Completion was verified through other documentation in the final packet.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01**

Consent Decree Tank System Number: **2216**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_FINAL PACKET	pdf	9/16/2017	Final Packet PDF

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_FINAL PACKET	pdf	9/16/2017	Final Packet PDF
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_SIGNED EVAL	pdf	6/27/2016	Signed Eval PDF
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_STEM ENG EVAL_rev1	xlsm	6/24/2016	STEM Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_FINAL PACKET	pdf	9/16/2017	Final Packet PDF

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_WALKDOWN	pdf	6/23/2016	Walkdown PDF

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_1188_NORMAL	mp4	6/23/2016	IR Verification Video
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_1189_DUMP	mp4	6/23/2016	IR Verification Video
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_1190_POST	mp4	6/23/2016	IR Verification Video
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_IR VERIFICATION	pdf	6/23/2016	IR Verification PDF

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01_SIGNED EVAL	pdf	6/27/2016	Signed Eval PDF

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01**  
**Consent Decree Tank System Number:** **2216**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,926</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>23,548</b>	<b>24,688</b>	
Total VCS Capacity (scfh)	<b>26,464</b>	<b>30,521</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,718</b>	<b>25,595</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01**

Consent Decree Tank System Number: **2216**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C)	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN GAGES GATES MNOOKIN SCARPULLA T4N-R65W-S17 L01**

Consent Decree Tank System Number: **2216**

**Audit Notes**

**1. Oil dump valve size could not be verified - Request additional data**

The Job Sheet (Final Packet pg 23 & 25) indicates a new LP separator was installed onsite. Check A1 on the STEM Walkdown Checklist (Final Packet pg 5-7) indicates that the proper 1/2" trim on the oil dump valve is installed. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**2. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 12-19) are not dated. Assumed the date is the same as Facility Scouting date (3/4/16).



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN MOSIER T4N-R65W-S22 L01**

Consent Decree Tank System Number: **2278**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CRAVEN MOSIER T4N-R65W-S22 L01_FINAL PACKET	.pdf	1/16/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN MOSIER T4N-R65W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	5/4/2018	STEM Engineering Evaluation Spreadsheet
CRAVEN MOSIER T4N-R65W-S22 L01_SIGNED EVAL	.pdf	5/4/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN MOSIER T4N-R65W-S22 L01_FINAL PACKET	.pdf	1/16/2017	Work Request
CRAVEN MOSIER T4N-R65W-S22 L01_FINAL PACKET	.pdf	1/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN MOSIER T4N-R65W-S22 L01_WALKDOWN	.pdf	1/12/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN MOSIER T4N-R65W-S22 L01_IR VERIFICATION	.pdf	1/12/2017	IR Verification Field Data Sheet
CRAVEN MOSIER T4N-R65W-S22 L01_0019_NORMAL	.mp4	1/12/2017	IR Camera Video Normal Operations
CRAVEN MOSIER T4N-R65W-S22 L01_0020_DUMP	.mp4	1/12/2017	IR Camera Video During Dump Event
CRAVEN MOSIER T4N-R65W-S22 L01_0021_POST	.mp4	1/12/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CRAVEN MOSIER T4N-R65W-S22 L01_SIGNED EVAL	.pdf	5/4/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** CRAVEN MOSIER T4N-R65W-S22 L01

**Consent Decree Tank System Number:** 2278

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,508	4,509	0%
Calculated Burner Capacity (scfh)	3,926	4,958	
Headspace Surge Capacity (scfh)	19,486	19,486	
Total VCS Capacity (scfh)	23,412	24,444	
VCS Capacity minus PPIVF (scfh)	18,904	19,935	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/15/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN MOSIER T4N-R65W-S22 L01**

Consent Decree Tank System Number: **2278**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CRAVEN MOSIER T4N-R65W-S22 L01**

Consent Decree Tank System Number: **2278**

**Audit Notes**

No notes, all documentation was consistent with the Modeling Guideline, Engineering Design Standard and itself.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CROSS PERLMAN T5N-R64W-S32 L01**

Consent Decree Tank System Number: **1724**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CROSS PERLMAN T5N-R64W-S32 L01_FINAL PACKET	.pdf	4/11/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CROSS PERLMAN T5N-R64W-S32 L01_STEM Engineering Eval_rev1	.xlsm	4/25/2017	STEM Engineering Evaluation Spreadsheet
CROSS PERLMAN T5N-R64W-S32 L01_SIGNED EVAL	.pdf	4/25/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CROSS PERLMAN T5N-R64W-S32 L01_FINAL PACKET	.pdf	4/11/2017	Work Request
CROSS PERLMAN T5N-R64W-S32 L01_FINAL PACKET	.pdf	4/11/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CROSS PERLMAN T5N-R64W-S32 L01_FINAL PACKET	.pdf	4/11/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CROSS PERLMAN T5N-R64W-S32 L01_IR VERIFICATION	.pdf	4/11/2017	IR Verification Field Data Sheet
CROSS PERLMAN T5N-R64W-S32 L01_1950_NORMAL	.mp4	4/7/2017	IR Camera Video Normal Operations
CROSS PERLMAN T5N-R64W-S32 L01_1951_DUMP	.mp4	4/7/2017	IR Camera Video During Dump Event
CROSS PERLMAN T5N-R64W-S32 L01_1952_POST	.mp4	4/7/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CROSS PERLMAN T5N-R64W-S32 L01_SIGNED EVAL	.pdf	4/25/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CROSS PERLMAN T5N-R64W-S32 L01**

**Consent Decree Tank System Number:** **1724**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,204</b>	<b>2,204</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,969</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>2,969</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>765</b>	<b>3,630</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CROSS PERLMAN T5N-R64W-S32 L01**

Consent Decree Tank System Number: **1724**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>414</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>43.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

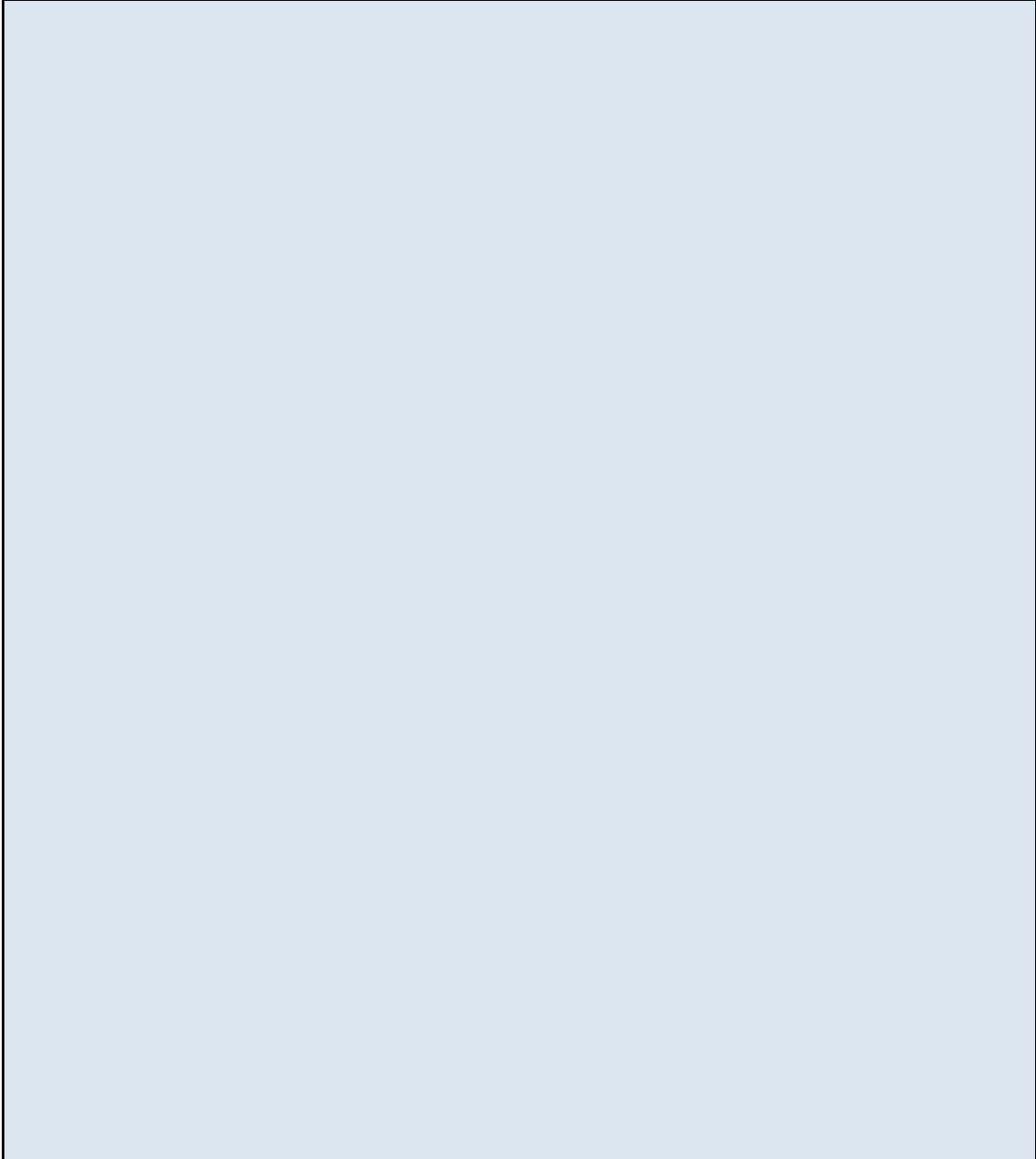
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,802</b>	<b>1,802</b>
Oil Tank Working Rate	<b>164</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,204</b>	<b>2,204</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CROSS PERLMAN T5N-R64W-S32 L01**

Consent Decree Tank System Number: **1724**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CUMMINS DILLARD JEANIE T7N-R64W-S10 L01**

Consent Decree Tank System Number: **576**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_FINAL PACKET	.pdf	8/15/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	8/21/2017	STEM Engineering Evaluation Spreadsheet
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation
2018 Draft Attachements to Comment Letter	.pdf	3/27/2020	Supplimental Engineering Documents

Modification Documents:

File Name	File Ext.	File Date	Document Description
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_FINAL PACKET	.pdf	8/15/2017	Work Request
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_FINAL PACKET	.pdf	8/15/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_WALKDOWN	.pdf	8/15/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_IR VERIFICATION	.pdf	8/15/2017	IR Verification Field Data Sheet
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_2283_NORMAL	.mp4	8/14/2017	IR Camera Video Normal Operations
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_2284_DUMP	.mp4	8/14/2017	IR Camera Video During Dump Event
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_2285_POST	.mp4	8/14/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CUMMINS DILLARD JEANIE T7N-R64W-S10 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CUMMINS DILLARD JEANIE T7N-R64W-S10 L01**

Consent Decree Tank System Number: **576**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>3</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>75</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>75</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,308</b>	<b>8,313</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,958</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>46,420</b>	<b>46,420</b>	
Total VCS Capacity (scfh)	<b>50,378</b>	<b>51,378</b>	
VCS Capacity minus PPIVF (scfh)	<b>42,070</b>	<b>43,065</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/4/2018  
 Audit Document Review Verified by: Angela M. Oberlander & James Van Horne  
 Audit Document Verification Date: 8/10/2018 & 8/10/2020

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CUMMINS DILLARD JEANIE T7N-R64W-S10 L01**

Consent Decree Tank System Number: **576**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>N/A</b>							
Z2								
Z3								
Z								
Gas/Oil Ratio (scf/bbl)	<b>4.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>36.50</b>							
Critical Pressure (psia) <sup>b</sup>	<b>544</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>88</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4245</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>17.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>40</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>36.50</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>8850</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>35</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>50</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>500</b>
scfh vapor/tank <sup>i</sup>	<b>396</b>	<b>396</b>
Mscfd	<b>29</b>	<b>29</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>708</b>	<b>708</b>
Oil Tank Working Rate	<b>1,682</b>	<b>1,678</b>
Water Tank Flash Rate	<b>1,475</b>	<b>1,475</b>
Water Tank Working Rate	<b>2,070</b>	<b>2,070</b>
Tank Breathing Rate	<b>2,377</b>	<b>2,377</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>8,313</b>	<b>8,308</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CUMMINS DILLARD JEANIE T7N-R64W-S10 L01**

Consent Decree Tank System Number: **576**

**Audit Notes**

Noble provided the following comment regarding the flash factor used for the condensate at this facility "All three (3) wells on this facility are completed in the Lyons formation. Lyons wells differ from wells completed in other formations in that the produced gas is largely inert (~90% CO<sub>2</sub> and N<sub>2</sub>). Additionally, whereas typical formations produce hydrocarbon gas that is in pressure-dependent equilibrium with the produced oil, the inert gas produced from Lyons wells is not in equilibrium with oil and is not pressure dependent.

Noble's Modeling Guideline provides several methods for applying flash factor. The most commonly applied method in Noble's Engineering Evaluations is the Valko-McCain method. Since the produced gas at the CUMMINS DILLARD JEANIE T7N-R64W-S10 L01 (TS# 576) facility is not in a pressure-dependent equilibrium with the produced oil, the Valko-McCain method of flash factor determination is not applicable. Noble utilized wellhead sampling and available permitting documentation to assign a flash factor for this location. A variety of Lyons wells were sampled across several Tank Systems, many of which detected negligible flash gas quantities. To ensure design adequacy, a conservative flash factor was assigned (4 scf/bbl), consistent with the highest measured flash factor across these locations."

The work request indicates a 4" AGL is to be installed. No confirmation on the job sheet that the upsized line was installed however the above ground line is visible in the IR Camera videos provided.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CYDNEY WHITE T3N-R64W-S33 L01**

Consent Decree Tank System Number: **1061**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
CYDNEY WHITE T3N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
CYDNEY WHITE T3N-R64W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
CYDNEY WHITE T3N-R64W-S33 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
CYDNEY WHITE T3N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
CYDNEY WHITE T3N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
CYDNEY WHITE T3N-R64W-S33 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
CYDNEY WHITE T3N-R64W-S33 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
CYDNEY WHITE T3N-R64W-S33 L01_4719_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
CYDNEY WHITE T3N-R64W-S33 L01_4720_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
CYDNEY WHITE T3N-R64W-S33 L01_4721_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
CYDNEY WHITE T3N-R64W-S33 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **CYDNEY WHITE T3N-R64W-S33 L01**

**Consent Decree Tank System Number:** **1061**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>276</b>	<b>276</b>	
Total VCS Capacity (scfh)	<b>4,496</b>	<b>4,876</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,052</b>	<b>1,431</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CYDNEY WHITE T3N-R64W-S33 L01**

Consent Decree Tank System Number: **1061**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **CYDNEY WHITE T3N-R64W-S33 L01**

Consent Decree Tank System Number: **1061**

**Audit Notes**

VOC Line Size: (From Tank to KO) Job Sheet does not confirm 3" VOC line size was installed from tank to KO as Work Request & Design Form requested. 2" shown as existing.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 8/23/2017; field verification confirmed that the 3" VOC line from the tank to the KO was installed."



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DABNEY SHELTON T4N-R65W-S23 L01**

Consent Decree Tank System Number: **2201**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DABNEY SHELTON T4N-R65W-S23 L01_FINAL PACKET	.pdf	10/12/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DABNEY SHELTON T4N-R65W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	6/14/2017	STEM Engineering Evaluation Spreadsheet
DABNEY SHELTON T4N-R65W-S23 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DABNEY SHELTON T4N-R65W-S23 L01_FINAL PACKET	.pdf	10/12/2015	Work Request
DABNEY SHELTON T4N-R65W-S23 L01_FINAL PACKET	.pdf	10/12/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DABNEY SHELTON T4N-R65W-S23 L01_WALKDOWN	.pdf	10/12/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DABNEY SHELTON T4N-R65W-S23 L01_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
DABNEY SHELTON T4N-R65W-S23 L01_0332_NORMAL	.mp4	10/8/2015	IR Camera Video Normal Operations
DABNEY SHELTON T4N-R65W-S23 L01_0333_DUMP	.mp4	10/8/2015	IR Camera Video During Dump Event
DABNEY SHELTON T4N-R65W-S23 L01_0334_POST	.mp4	10/8/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DABNEY SHELTON T4N-R65W-S23 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DABNEY SHELTON T4N-R65W-S23 L01**

**Consent Decree Tank System Number:** **2201**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,016</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>173</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>5,189</b>	<b>6,542</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,344</b>	<b>2,696</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/4/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DABNEY SHELTON T4N-R65W-S23 L01**

Consent Decree Tank System Number: **2201**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,845</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DABNEY SHELTON T4N-R65W-S23 L01**

Consent Decree Tank System Number: **2201**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DANE FRICO REI T3N-R65W-S10 L01**

Consent Decree Tank System Number: **2105**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
DANE FRICO REI T3N-R65W-S10 L01_FINAL PACKET	.pdf	3/11/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
DANE FRICO REI T3N-R65W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	3/24/2016	STEM Engineering Evaluation Spreadsheet
DANE FRICO REI T3N-R65W-S10 L01_SIGNED EVAL	.pdf	3/24/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
DANE FRICO REI T3N-R65W-S10 L01_FINAL PACKET	.pdf	3/11/2016	Work Request
DANE FRICO REI T3N-R65W-S10 L01_FINAL PACKET	.pdf	3/11/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
DANE FRICO REI T3N-R65W-S10 L01_WALKDOWN	.pdf	3/8/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
DANE FRICO REI T3N-R65W-S10 L01_IR VERIFICATION	.pdf	3/8/2016	IR Verification Field Data Sheet
DANE FRICO REI T3N-R65W-S10 L01_0747_NORMAL	.mp4	3/8/2016	IR Camera Video Normal Operations
DANE FRICO REI T3N-R65W-S10 L01_0748_DUMP	.mp4	3/8/2016	IR Camera Video During Dump Event
DANE FRICO REI T3N-R65W-S10 L01_0749_POST	.mp4	3/8/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
DANE FRICO REI T3N-R65W-S10 L01_SIGNED EVAL	.pdf	3/24/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DANE FRICO REI T3N-R65W-S10 L01**

**Consent Decree Tank System Number:** **2105**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>285</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>9,104</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>20,416</b>	<b>21,049</b>	
Total VCS Capacity (scfh)	<b>23,332</b>	<b>26,882</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,553</b>	<b>17,779</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 1/29/2018  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 2/8/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DANE FRICO REI T3N-R65W-S10 L01**

Consent Decree Tank System Number: **2105**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	285	0
scfh vapor/tank <sup>i</sup>	226	0
Mscfd	16	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	678	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>9,104</b>	<b>8,779</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DANE FRICO REI T3N-R65W-S10 L01**

Consent Decree Tank System Number: **2105**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 11-16) are not dated. Assumed the date is the same as Facility Scouting date (11/6/2015).

**2. Tank Size and Fill Capacity Inconsistency - Underestimating VCS Capacity**

The Engineering Evaluation (Signed Eval pdf) was run with three 300 bbl oil tanks at a 63% max fill level (includes one empty vapor space tank). The Field Datasheets (Final Packet, pg 12) show the oil tanks onsite are 285 bbl tanks and no information was observed to suggest the tanks were modified. With one vapor space tank, a maximum fill capacity of 60% was calculated  $[(285 \text{ bbl} * 90\% \text{ max fill} * 2 \text{ tanks}) / (3 \text{ tanks} * 285 \text{ bbl})]$ . By using the 63% max fill capacity, the control system capacity is underestimated and therefore meets the Engineering Design Standard.

Note: The presence of a vapor space tank was verified using item C13 of the Walkdown Checklist (Final Packet, pg 8), being marked as "n/a", assumed to indicate all tanks cannot be filled from the separators.

**3. Oil dump valve size unknown**

The field data sheets (Final Packet, pg 14) indicates the existing HLP separators have 2" oil dump valves. The Engineering Evaluation workbook (DANE FRICO REI T3N-R65W-S10 L01\_STEM Engineering Evaluation\_rev1) was run using a 1" oil dump valve size for the Signed Evaluation. The Job Sheet (Final Packet, pg 20) specifies "Reduced oil dump", however, it is unclear if this refers to the reduction of the valve and/or the trim size as the Stem Work Request (Final Packet, pg 3) requested the oil dump valve trim be reduced to 1/2". If the 2" oil dump valves were not changed the PPIVFR is being underestimated and the Modeling Guideline cannot be confirmed. Assuming a 2" valve size on the separator does not show an exceedance of the vapor control system capacity.



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

0.6

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DANKS ROTHE T4N-R63W-S6 L01**

Consent Decree Tank System Number: **2312**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
DANKS ROTHE T4N-R63W-S6 L01_FINAL PACKET	.pdf	5/2/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
DANKS ROTHE T4N-R63W-S6 L01_STEM Engineering Evaluation_rev1	.xlsm	5/9/2017	STEM Engineering Evaluation Spreadsheet
DANKS ROTHE T4N-R63W-S6 L01_Final Signed STEM Plan	.pdf	7/12/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
DANKS ROTHE T4N-R63W-S6 L01_FINAL PACKET	.pdf	5/2/2017	Work Request
DANKS ROTHE T4N-R63W-S6 L01_FINAL PACKET	.pdf	5/2/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
DANKS ROTHE T4N-R63W-S6 L01_WALKDOWN	.pdf	5/2/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
DANKS ROTHE T4N-R63W-S6 L01_IR VERIFICATION	.pdf	5/1/2017	IR Verification Field Data Sheet
DANKS ROTHE T4N-R63W-S6 L01_1993_NORMAL	.mp4	5/1/2017	IR Camera Video Normal Operations
DANKS ROTHE T4N-R63W-S6 L01_1994_DUMP	.mp4	5/1/2017	IR Camera Video During Dump Event
DANKS ROTHE T4N-R63W-S6 L01_1995_POST	.mp4	5/1/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
DANKS ROTHE T4N-R63W-S6 L01_SIGNED EVAL	.pdf	5/9/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DANKS ROTHE T4N-R63W-S6 L01**

Consent Decree Tank System Number: **2312**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>495</b>	<b>495</b>	
Total VCS Capacity (scfh)	<b>4,522</b>	<b>5,453</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,078</b>	<b>2,009</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 3/27/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/28/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DANKS ROTHE T4N-R63W-S6 L01**

Consent Decree Tank System Number: **2312**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DANKS ROTHE T4N-R63W-S6 L01**

Consent Decree Tank System Number: **2312**

**Audit Notes**

The walkdown checklist is not marked complete  
The trim size of the oil dump valve on the LP cannot be confirmed as 1/2" as requested from the stem work request from (PG 3 of PDF)  
CB - Job sheets do not confirm that the LP separator LP dump valve trim size as 1/2". The positive response to Item A1 of the STEM Retrofit Walkdown Checklist will be used as confirmation that the valve trim size is consistent with the engineering evaluation.

CB - No further information is required for this evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DARLING SIAN SWANSON T6N-R65W-S27 L01**

Consent Decree Tank System Number: **78**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DARLING SIAN SWANSON T6N-R65W-S27 L01_FINAL PACKET	.pdf	11/3/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DARLING SIAN SWANSON T6N-R65W-S27 L01_STEM Engineering Evaluation_rev1	.xlsm	12/21/2017	STEM Engineering Evaluation Spreadsheet
DARLING SIAN SWANSON T6N-R65W-S27 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DARLING SIAN SWANSON T6N-R65W-S27 L01_FINAL PACKET	.pdf	11/3/2015	Work Request
DARLING SIAN SWANSON T6N-R65W-S27 L01_FINAL PACKET	.pdf	11/3/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DARLING SIAN SWANSON T6N-R65W-S27 L01_FINAL PACKET	.pdf	11/3/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DARLING SIAN SWANSON T6N-R65W-S27 L01_IR VERIFICATION	.pdf	11/3/2015	IR Verification Field Data Sheet
DARLING SIAN SWANSON T6N-R65W-S27 L01_0418_NORMAL	.mp4	11/2/2015	IR Camera Video Normal Operations
DARLING SIAN SWANSON T6N-R65W-S27 L01_0419_DUMP	.mp4	11/2/2015	IR Camera Video During Dump Event
DARLING SIAN SWANSON T6N-R65W-S27 L01_0420_POST	.mp4	11/2/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DARLING SIAN SWANSON T6N-R65W-S27 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DARLING SIAN SWANSON T6N-R65W-S27 L01**

Consent Decree Tank System Number: **78**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>COMM 200 48"</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>157</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,796</b>	<b>7,797</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,738</b>	<b>11,142</b>	
Headspace Surge Capacity (scfh)	<b>4,332</b>	<b>4,332</b>	
Total VCS Capacity (scfh)	<b>12,070</b>	<b>15,474</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,274</b>	<b>7,676</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/12/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DARLING SIAN SWANSON T6N-R65W-S27 L01**

Consent Decree Tank System Number: **78**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.80</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>162.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,753</b>	<b>6,753</b>
Oil Tank Working Rate	<b>569</b>	<b>568</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>7,797</b>	<b>7,796</b>

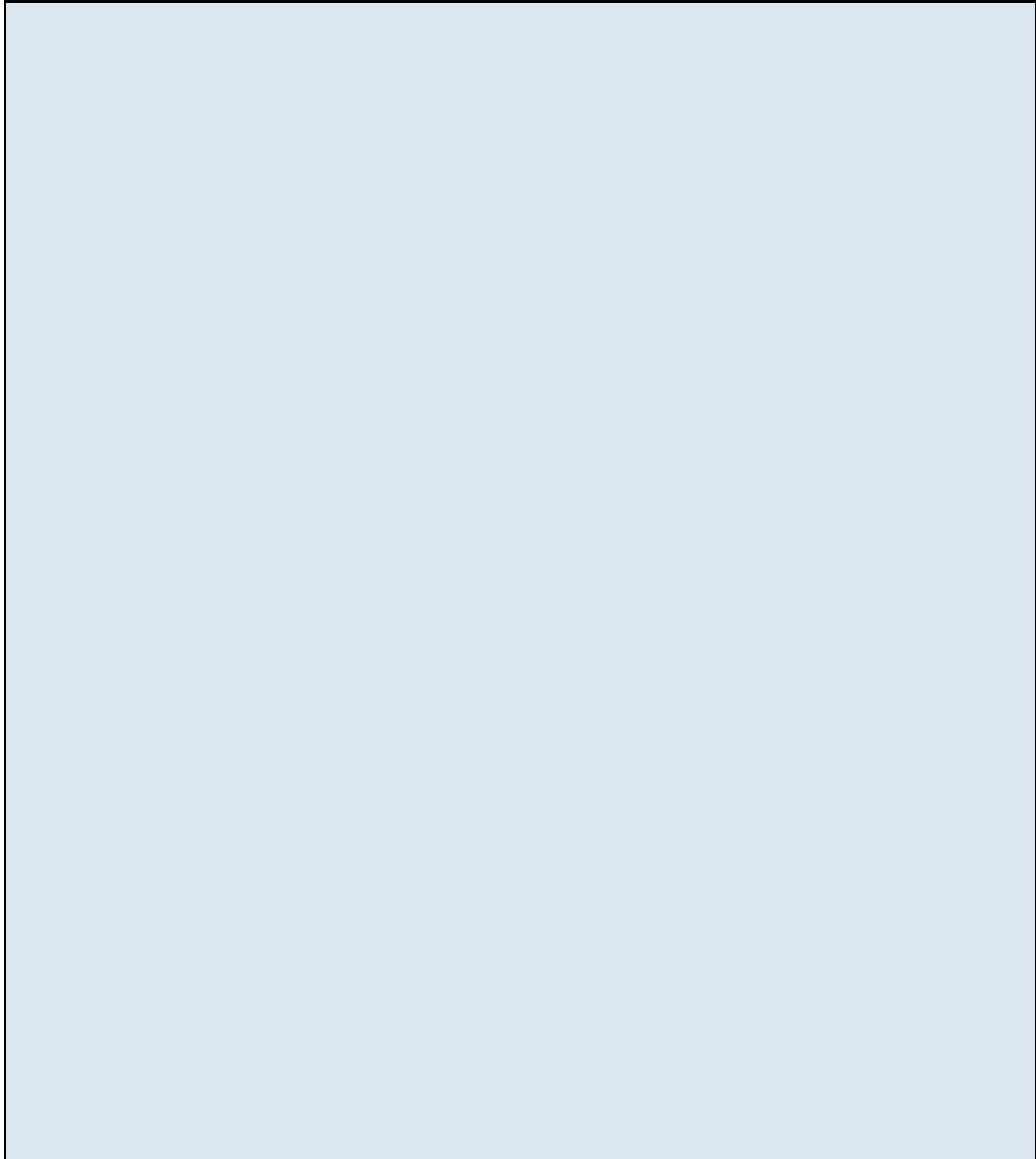


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DARLING SIAN SWANSON T6N-R65W-S27 L01**

Consent Decree Tank System Number: **78**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DAVIS T5N-R65W-S4 L01**

Consent Decree Tank System Number: **2305**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DAVIS T5N-R65W-S4 L01_FINAL PACKET	.pdf	9/11/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DAVIS T5N-R65W-S4 L01_STEM Engineering Evaluation_rev1	.xlsm	6/20/2017	STEM Engineering Evaluation Spreadsheet
DAVIS T5N-R65W-S4 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DAVIS T5N-R65W-S4 L01_FINAL PACKET	.pdf	9/11/2015	Work Request
DAVIS T5N-R65W-S4 L01_FINAL PACKET	.pdf	9/11/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DAVIS T5N-R65W-S4 L01_FINAL PACKET	.pdf	9/11/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DAVIS T5N-R65W-S4 L01_IR VERIFICATION	.pdf	9/10/2015	IR Verification Field Data Sheet
DAVIS T5N-R65W-S4 L01_0250_NORMAL	.mp4	9/9/2015	IR Camera Video Normal Operations
DAVIS T5N-R65W-S4 L01_0251_NORMAL	.mp4	9/9/2015	IR Camera Video During Dump Event
DAVIS T5N-R65W-S4 L01_0252_NORMAL	.mp4	9/9/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DAVIS T5N-R65W-S4 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DAVIS T5N-R65W-S4 L01**

**Consent Decree Tank System Number:** **2305**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>310</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,435</b>	<b>7,437</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,051</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>5,177</b>	<b>5,177</b>	
Total VCS Capacity (scfh)	<b>10,228</b>	<b>11,719</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,793</b>	<b>4,282</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/12/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DAVIS T5N-R65W-S4 L01**

Consent Decree Tank System Number: **2305**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.72	0.72						
Gas/Oil Ratio (scf/bbl)	96.4	96.4						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	530	530						
Vapor Pressure (psia) <sup>c</sup>	73	73						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	759	759						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2	73.2						
Working Flow (Mscfd) <sup>h,i</sup>	7	7						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	310	0
scfh vapor/tank <sup>i</sup>	246	0
Mscfd	18	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,098	6,098
Oil Tank Working Rate	602	600
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	737	737
Truck Loading Vapor	0	0
<b>Total</b>	<b>7,437</b>	<b>7,435</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DAVIS T5N-R65W-S4 L01**

Consent Decree Tank System Number: **2305**

**Audit Notes**

The stem work request (PG 3 of the Final Packet) states bring the VOC line above ground and update to 4" VOC header however nowhere in the Job Sheets (PGs 19-22 of the Final Packet) does it confirm this task was completed

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 8/27/2015, field verification confirmed that the 4" above ground VOC line was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECHANT COHN CROWE UPRR T3N-R65W-S25 L01**

Consent Decree Tank System Number: **2173**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_FINAL PACKET	.pdf	3/31/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	12/5/2016	STEM Engineering Evaluation Spreadsheet
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_SIGNED EVAL	.pdf	12/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_FINAL PACKET	.pdf	3/31/2016	Work Request
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_FINAL PACKET	.pdf	3/31/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_WALKDOWN	.pdf	11/10/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_1690_NORMAL	.mp4	11/10/2016	IR Camera Video Normal Operations
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_1691_DUMP	.mp4	11/10/2016	IR Camera Video During Dump Event
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_1692_POST	.mp4	11/10/2016	IR Camera Video Post Dump Event
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_IR VERIFICATION	.pdf	11/10/2016	IR Verification Field Data Sheet

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DECHANT COHN CROWE UPRR T3N-R65W-S25 L01_SIGNED EVAL	.pdf	12/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DECHANT COHN CROWE UPRR T3N-R65W-S25 L01**  
**Consent Decree Tank System Number:** **2173**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>32,967</b>	<b>32,974</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,860</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>154,989</b>	<b>156,051</b>	
Total VCS Capacity (scfh)	<b>157,849</b>	<b>161,884</b>	
VCS Capacity minus PPIVF (scfh)	<b>124,882</b>	<b>128,910</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 3/29/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 4/3/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECHANT COHN CROWE UPRR T3N-R65W-S25 L01**

Consent Decree Tank System Number: **2173**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.76</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>57.00</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>6378</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>719.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>61</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>29,971</b>	<b>29,971</b>
Oil Tank Working Rate	<b>2,527</b>	<b>2,521</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>32,974</b>	<b>32,967</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECHANT COHN CROWE UPRR T3N-R65W-S25 L01**

Consent Decree Tank System Number: **2173**

**Audit Notes**

1. The Work Order in the Final Packet, pg 3, indicates a tank is to be removed from liquid service and utilized in vapor service as a headspace tank. No indication on the Job Sheet, Final Packet pg 35, that the tank conversion was completed. The Final Walkdown Checklist, Item C13, does not confirm or negate the tank service conversion because it is checked as Not Applicable (N/A). Noble indicated in a data request on 2/20/2018 that on or around 9/6/2016 field confirmation verified a tank had been converted for use as vapor headspace.

2. The STEM Engineering Evaluation file provided was "Not Solved." Engaged the solver macro and obtained different headspace information for the site configuration.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECHANT T3N-R64W-S7 L02**

Consent Decree Tank System Number: **380**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
DECHANT T3N-R64W-S7 L02_FINAL PACKET	.pdf	2/8/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
DECHANT T3N-R64W-S7 L02_STEM Engineering Evaluation_rev1	.xlsm	7/28/2016	STEM Engineering Evaluation Spreadsheet
DECHANT T3N-R64W-S7 L02_SIGNED EVAL	.pdf	8/1/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
DECHANT T3N-R64W-S7 L02_FINAL PACKET	.pdf	5/4/2016	Work Request
DECHANT T3N-R64W-S7 L02_FINAL PACKET	.pdf	5/24/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
DECHANT T3N-R64W-S7 L02_WALKDOWN	.pdf	7/7/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
DECHANT T3N-R64W-S7 L02_IR VERIFICATION	.pdf	7/5/2016	IR Verification Field Data Sheet
DECHANT T3N-R64W-S7 L02_1244_NORMAL	.mp4	7/5/2017	IR Camera Video Normal Operations
DECHANT T3N-R64W-S7 L02_1245_DUMP	.mp5	7/5/2017	IR Camera Video During Dump Event
DECHANT T3N-R64W-S7 L02_1246_POST	.mp6	7/5/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
DECHANT T3N-R64W-S7 L02_SIGNED EVAL	.pdf	8/1/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECHANT T3N-R64W-S7 L02**

Consent Decree Tank System Number: **380**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,462</b>	<b>13,464</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,639</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>26,056</b>	<b>26,056</b>	
Total VCS Capacity (scfh)	<b>32,695</b>	<b>35,256</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,233</b>	<b>21,792</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/8/2017

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECHANT T3N-R64W-S7 L02**

Consent Decree Tank System Number: **380**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>13,464</b>	<b>13,462</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECHANT T3N-R64W-S7 L02**

Consent Decree Tank System Number: **380**

**Audit Notes**

Size of TEC combustors is not listed in Field Datasheet (DECHANT T3N-R64W-S7 L02\_FINAL PACKET p 17). Did not verify size. Assuming size is correct as Engineering Evaluation (DECHANT T3N-R64W-S7 L02\_SIGNED EVAL) lists them as 48" and no changes to existing combustors were requested or documented.

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECKER KRIEG SCHMIDT T4N-R66W-S26 L01**

Consent Decree Tank System Number: **2097**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_FINAL PACKET	PDF	5/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_STEM Engineering Evaluation_rev1	PDF	8/17/2016	STEM Engineering Evaluation Spreadsheet
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_SIGNED EVAL	PDF	8/17/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_FINAL PACKET	PDF	6/7/2016	Work Request
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_FINAL PACKET	PDF	7/27/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_WALKDOWN	PDF	8/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_IR VERIFICATION	PDF	8/16/2016	IR Verification Field Data Sheet
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_1396_NORMAL	MP4	5/15/2016	IR Camera Video Normal Operations
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_1397_DUMP	MP4	5/15/2016	IR Camera Video During Dump Event
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_1398_POST	MP4	5/15/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DECKER KRIEG SCHMIDT T4N-R66W-S26 L01_SIGNED EVAL	PDF	8/17/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECKER KRIEG SCHMIDT T4N-R66W-S26 L01**

Consent Decree Tank System Number: **2097**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,953</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>600</b>	<b>600</b>	
Total VCS Capacity (scfh)	<b>4,553</b>	<b>5,558</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,109</b>	<b>1,971</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm

Audit Document Review Date: 3/22/2018

Audit Document Review Verified by: Angela M. Oberlander

Audit Document Verification Date: 4/2/2018

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECKER KRIEG SCHMIDT T4N-R66W-S26 L01**

Consent Decree Tank System Number: **2097**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (k)	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (k)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	6	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,587</b>	<b>3,444</b>



## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DECKER KRIEG SCHMIDT T4N-R66W-S26 L01**

Consent Decree Tank System Number: **2097**

### Audit Notes

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART ST USX T6N-R62W-S16 L01**

Consent Decree Tank System Number: **363**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DEGENHART ST USX T6N-R62W-S16 L01_FINAL PACKET	.pdf	9/18/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART ST USX T6N-R62W-S16 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
DEGENHART ST USX T6N-R62W-S16 L01_SIGNED EVAL	.pdf	1/25/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART ST USX T6N-R62W-S16 L01_FINAL PACKET	.pdf	9/18/2015	Work Request
DEGENHART ST USX T6N-R62W-S16 L01_FINAL PACKET	.pdf	9/18/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART ST USX T6N-R62W-S16 L01_WALKDOWN	.pdf	9/3/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART ST USX T6N-R62W-S16 L01_IR VERIFICATION	.pdf	9/31/2015	IR Verification Field Data Sheet
DEGENHART ST USX T6N-R62W-S16 L01_0196_NORMAL	.mp4	9/31/2015	IR Camera Video Normal Operations
DEGENHART ST USX T6N-R62W-S16 L01_0197_DUMP	.mp4	9/31/2015	IR Camera Video During Dump Event
DEGENHART ST USX T6N-R62W-S16 L01_0198_POST	.mp4	9/31/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART ST USX T6N-R62W-S16 L01_SIGNED EVAL	.pdf	1/25/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DEGENHART ST USX T6N-R62W-S16 L01**

**Consent Decree Tank System Number:** **363**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,452</b>	<b>7,987</b>	<b>7%</b>
Calculated Burner Capacity (scfh)	<b>2,984</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>6,136</b>	<b>8,652</b>	
Total VCS Capacity (scfh)	<b>9,120</b>	<b>14,485</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,668</b>	<b>6,498</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/29/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART ST USX T6N-R62W-S16 L01**

Consent Decree Tank System Number: **363**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>34</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,885</b>
Oil Tank Working Rate	<b>314</b>	<b>327</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,426</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>7,987</b>	<b>7,452</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART ST USX T6N-R62W-S16 L01**

Consent Decree Tank System Number: **363**

**Audit Notes**

Field Datasheet reports 2 LEED HOC 48" combustors. Model demonstrates with only 1 LEED 48" Gen 1 #7. While this is conservative and does not affect EDS, it is not consistent with the field data.

IR footage of "Normal" operations shows emissions release at 2:08, and appears to be coming from the tanks behind those immediately being filmed. It should be noted that only 4 of the 6 tanks were filmed and the one apparently releasing was one of the two not directly captured by the IR footage.

The NEI Evaluation was completed as though the tanks were banked in a configuration of 2 banks of 3 tanks each. The STEM Work Request, Job Sheet, and Walkdown Checklist all indicate that the tanks have been un-banked. The NEI Evaluation does not account for breathing losses from the all 6 tanks due to the banking configuration. The PPIVFR may be underestimated, thus the Modeling Guidelines were not strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART T6N-R62W-S9 L01**

Consent Decree Tank System Number: **1942**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DEGENHART T6N-R62W-S9 L01_FINAL PACKET	.pdf	10/12/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART T6N-R62W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	6/3/2016	STEM Engineering Evaluation Spreadsheet
DEGENHART T6N-R62W-S9 L01_SIGNED EVAL	.pdf	6/7/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART T6N-R62W-S9 L01_FINAL PACKET, DEGENHART T6N-R62W-S9 L01_COMPLETED REWORK	.pdf	10/12/2015, 5/13/2016	Work Request
DEGENHART T6N-R62W-S9 L01_FINAL PACKET	.pdf	10/12/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART T6N-R62W-S9 L01_WALKDOWN	.pdf	10/12/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART T6N-R62W-S9 L01_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
DEGENHART T6N-R62W-S9 L01_0319_NORMAL	.mp4	10/7/2015	IR Camera Video Normal Operations
DEGENHART T6N-R62W-S9 L01_0320_DUMP	.mp4	10/7/2015	IR Camera Video During Dump Event
DEGENHART T6N-R62W-S9 L01_0321_POST	.mp4	10/7/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART T6N-R62W-S9 L01_SIGNED EVAL	.pdf	6/7/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DEGENHART T6N-R62W-S9 L01**

**Consent Decree Tank System Number:** **1942**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>260</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>48,239</b>	<b>48,241</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,046</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>70,599</b>	<b>70,599</b>	
Total VCS Capacity (scfh)	<b>75,645</b>	<b>77,141</b>	
VCS Capacity minus PPIVF (scfh)	<b>27,406</b>	<b>28,900</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/12/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART T6N-R62W-S9 L01**

Consent Decree Tank System Number: **1942**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>2.07</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>2.19</b>							
Gas/Oil Ratio (scf/bbl)	<b>625.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>708</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>273</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.79</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1796</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1123.6</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>17</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>46,816</b>	<b>46,816</b>
Oil Tank Working Rate	<b>712</b>	<b>710</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>48,241</b>	<b>48,239</b>

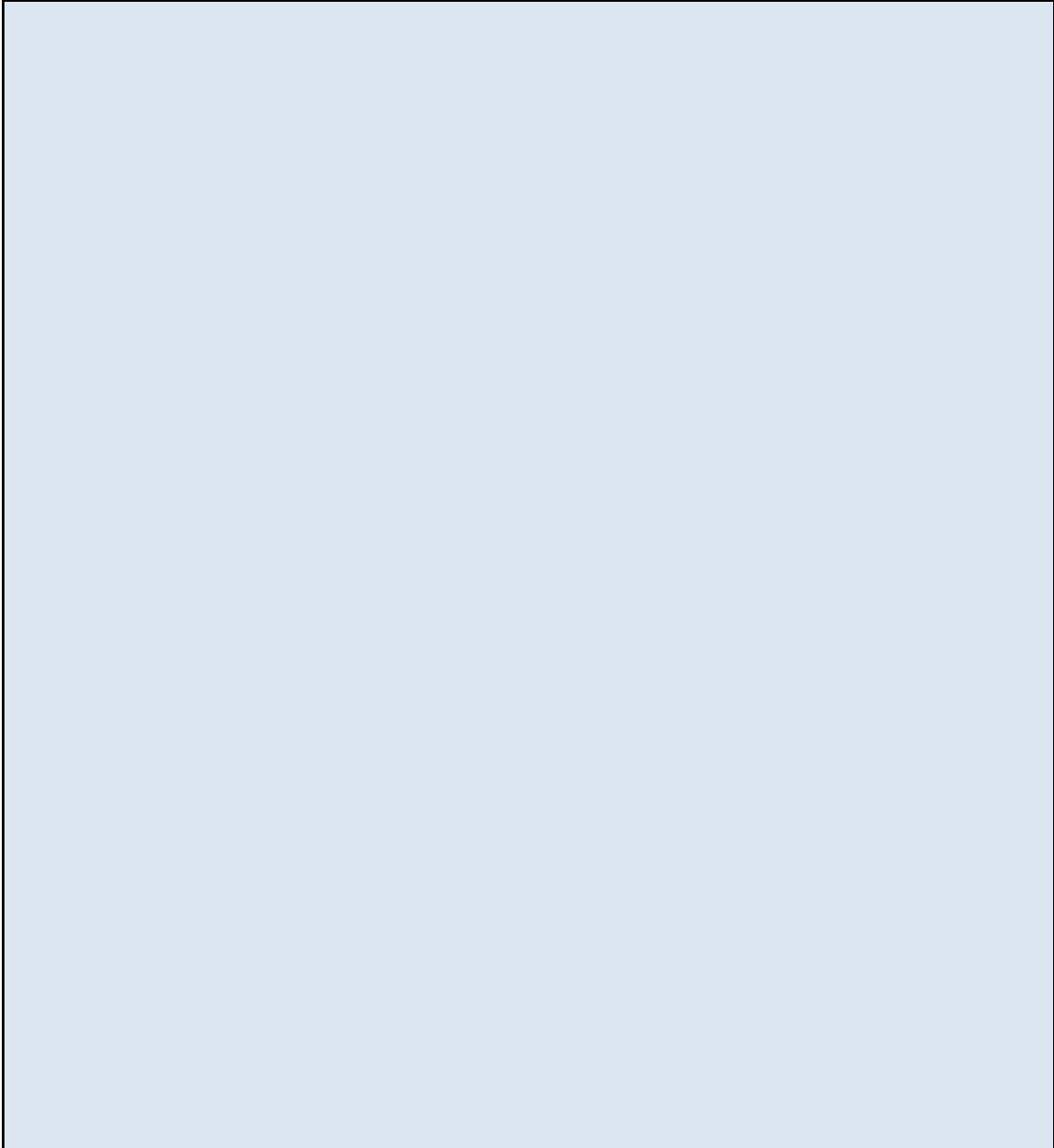


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART T6N-R62W-S9 L01**

Consent Decree Tank System Number: **1942**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART USX T6N-R62W-S17 L02**

Consent Decree Tank System Number: **1605**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DEGENHART USX T6N-R62W-S17 L02_FINAL PACKET	.pdf	10/21/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART USX T6N-R62W-S17 L02_STEM Engineering Evaluation_rev1	.xlsm	6/2/2016	STEM Engineering Evaluation Spreadsheet
DEGENHART USX T6N-R62W-S17 L02_SIGNED EVAL	.pdf	6/3/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART USX T6N-R62W-S17 L02_FINAL PACKET	.pdf	10/21/2015	Work Request
DEGENHART USX T6N-R62W-S17 L02_FINAL PACKET	.pdf	10/21/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART USX T6N-R62W-S17 L02_WALKDOWN	.pdf	10/19/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART USX T6N-R62W-S17 L02_IR VERIFICATION	.pdf	10/19/2015	IR Verification Field Data Sheet
DEGENHART USX T6N-R62W-S17 L02_0355_NORMAL	.mp4	10/19/2015	IR Camera Video Normal Operations
DEGENHART USX T6N-R62W-S17 L02_0356_DUMP	.mp4	10/19/2015	IR Camera Video During Dump Event
DEGENHART USX T6N-R62W-S17 L02_0357_POST	.mp4	10/19/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DEGENHART USX T6N-R62W-S17 L02_SIGNED EVAL	.pdf	6/3/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DEGENHART USX T6N-R62W-S17 L02**

**Consent Decree Tank System Number:** **1605**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>260</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>48,239</b>	<b>48,241</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,050</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>70,600</b>	<b>70,600</b>	
Total VCS Capacity (scfh)	<b>75,650</b>	<b>77,142</b>	
VCS Capacity minus PPIVF (scfh)	<b>27,411</b>	<b>28,901</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/17/2018 & 11/26/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART USX T6N-R62W-S17 L02**

Consent Decree Tank System Number: **1605**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>2.07</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>2.19</b>							
Gas/Oil Ratio (scf/bbl)	<b>625.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>708</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>273</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.79</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1796</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1123.6</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>17</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>46,816</b>	<b>46,816</b>
Oil Tank Working Rate	<b>712</b>	<b>710</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>48,241</b>	<b>48,239</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEGENHART USX T6N-R62W-S17 L02**

Consent Decree Tank System Number: **1605**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 9-14) are not dated. Date assumed to be same as Facility Scouting Date (6/17/2015).

**2. Vapor Surge Vessel**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did (did not) confirm a tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable separator to produce into all tanks. Additional information was not provided to clarify the inconsistent and conflicting information, thus it is unknown whether the Engineering Design Standard for properly applied.

**Request confirmation from Noble that one tank was bottomed out (isolated from liquid service and used as headspace only tank).**

**Update 11-26-2018 - Noble confirmed via data request that field verification confirmed one tank was converted to a headspace tank onsite.**

**3. Separator Certification Maximum Pressure - Request additional data**

The Job Sheet indicates a 300# separator was installed, replacing the previous 500# separator. The signed Engineering Evaluation indicates a Certification Maximum Pressure of 260 psi with the control method listed as "Shut-in of HP Hi/Lo."

**Confirm with Noble the separator operating pressure onsite is 260 psi.**

**Update 11-26-2018 - Noble confirmed via data request that HP Separator onsite is set to no higher than 260 psig onsite. Modeling Guideline is being followed.**

**4. Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 19) indicates a new separator with a 1/2" oil trim was installed onsite. There is no indication of the oil dump valve size installed in the separator.

A 2" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve is the largest (most conservative) that can be utilized and therefore the modeling guideline can be confirmed as being followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEJONG T5N-R65W-S24 L01**

Consent Decree Tank System Number: **2081**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DEJONG T5N-R65W-S24 L01_FINAL PACKET	.pdf	8/12/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DEJONG T5N-R65W-S24 L01_STEM Engineering Evaluation_rev1	.xlsm	2/28/2017	STEM Engineering Evaluation Spreadsheet
DEJONG T5N-R65W-S24 L01_SIGNED EVAL	.pdf	2/28/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DEJONG T5N-R65W-S24 L01_FINAL PACKET	.pdf	10/11/2019	Work Request
DEJONG T5N-R65W-S24 L01_FINAL PACKET	.pdf	2/2/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DEJONG T5N-R65W-S24 L01_WALKDOWN	.pdf	2/27/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DEJONG T5N-R65W-S24 L01_FINAL PACKET	.pdf	2/24/2017	IR Verification Field Data Sheet
DEJONG T5N-R65W-S24 L01_0124_NORMAL	.mp4	2/24/2017	IR Camera Video Normal Operations
DEJONG T5N-R65W-S24 L01_0125_DUMP	.mp4	2/24/2017	IR Camera Video During Dump Event
DEJONG T5N-R65W-S24 L01_0126_POST	.mp4	2/24/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DEJONG T5N-R65W-S24 L01_SIGNED EVAL	.pdf	2/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEJONG T5N-R65W-S24 L01**

Consent Decree Tank System Number: **2081**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>315</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>1"</b>
# VOC Lines Tanks to KO:	<b>3</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,456</b>	<b>3,599</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>462</b>	<b>462</b>	
Total VCS Capacity (scfh)	<b>4,489</b>	<b>5,420</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,033</b>	<b>1,821</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 3/22/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 4/2/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEJONG T5N-R65W-S24 L01**

Consent Decree Tank System Number: **2081**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (C)	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	315	0
scfh vapor/tank <sup>i</sup>	250	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	250	250
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,599</b>	<b>3,456</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEJONG T5N-R65W-S24 L01**

Consent Decree Tank System Number: **2081**

**Audit Notes**

Field Datasheet (DEJONG T5N-R65W-S24 L01\_FINAL PACKET, p 11) has no date but data presented make sense given data from Work Request, Job Sheet, Engineering Eval. Assuming Field Datasheet was completed prior to any work on site.

Job Sheet (DEJONG T5N-R65W-S24 L01\_FINAL PACKET p 21) states that PSHH on LP separator was set to 50 psig, however STEM Work Request Form (p 3) requests and QC STEM Checkout (p 26) confirms that PSHH was set to 60 psig. Assuming PSHH is set as designed at 60 psig.

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the largest available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEVRIES ST T6N-R64W-S36 L01**

Consent Decree Tank System Number: **1228**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DEVRIES ST T6N-R64W-S36 L01_FINAL PACKET	.pdf	7/7/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DEVRIES ST T6N-R64W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	7/12/2017	STEM Engineering Evaluation Spreadsheet
DEVRIES ST T6N-R64W-S36 L01_SIGNED EVAL	.pdf	7/18/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DEVRIES ST T6N-R64W-S36 L01_FINAL PACKET	.pdf	8/2/2016	Work Request
DEVRIES ST T6N-R64W-S36 L01_FINAL PACKET	.pdf	11/13/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DEVRIES ST T6N-R64W-S36 L01_WALKDOWN	.pdf	1/13/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DEVRIES ST T6N-R64W-S36 L01_FINAL PACKET	.pdf	1/13/2017	IR Verification Field Data Sheet
DEVRIES ST T6N-R64W-S36 L01_0026_NORMAL	.mp4	1/13/2017	IR Camera Video Normal Operations
DEVRIES ST T6N-R64W-S36 L01_0027_DUMP	.mp4	1/13/2017	IR Camera Video During Dump Event
DEVRIES ST T6N-R64W-S36 L01_0028_POST	.mp4	1/13/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DEVRIES ST T6N-R64W-S36 L01_SIGNED EVAL	.pdf	7/18/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEVRIES ST T6N-R64W-S36 L01**

Consent Decree Tank System Number: **1228**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>COMM 200 48"</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>157</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,511</b>	<b>7,511</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,531</b>	<b>11,142</b>	
Headspace Surge Capacity (scfh)	<b>28,589</b>	<b>29,425</b>	
Total VCS Capacity (scfh)	<b>36,120</b>	<b>40,567</b>	
VCS Capacity minus PPIVF (scfh)	<b>28,609</b>	<b>33,055</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 3/22/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 4/2/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEVRIES ST T6N-R64W-S36 L01**

Consent Decree Tank System Number: **1228**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>317</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>7,511</b>	<b>7,511</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DEVRIES ST T6N-R64W-S36 L01**

Consent Decree Tank System Number: **1228**

### Audit Notes

The Field Datasheet (DEVRIES ST T6N-R64W-S36 L01\_FINAL PACKET, p 10) does not have a date listed however the data shown makes sense given the subsequent documentation. Assuming that the field data sheet was completed prior to any changes on site.

The Field Datasheet (DEVRIES ST T6N-R64W-S36 L01\_FINAL PACKET, p 10) lists separator oil dumps as having 1/4" trims but the Job Sheet confirms trims are 1/2", the spec listed in the Engineering Evaluation. Assuming that the Job Sheet is correct as this is the more conservative option and it meets Engineering Evaluation specifications.

NEI Evaluation was completed with one of the three tanks out of service as additional headspace. Neither the work order or the construction jobsheet indicated a tank was disabled from receiving liquids while remaining connected to the VCS. Verify tank was bottomed out for additional headspace. Information request to NEI.

NEI Responded with documentation confirming the third tank was isolated as an additional headspace tank for truck load-out. The new configuration includes an additional check valve in the VOC header. Assumed NEI pipeline hydraulics calculations account for the resulting increased pressure drop in the VOC line due to that new check valve.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DIETRICH T4N-R64W-S7 L01**

Consent Decree Tank System Number: **623**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DIETRICH T4N-R64W-S7 L01_FINAL PACKET	.pdf	5/2/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DIETRICH T4N-R64W-S7 L01_STEM Engineering Evaluation_rev1	.xlsm	5/3/2016	STEM Engineering Evaluation Spreadsheet
DIETRICH T4N-R64W-S7 L01_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DIETRICH T4N-R64W-S7 L01_FINAL PACKET	.pdf	5/2/2016	Work Request
DIETRICH T4N-R64W-S7 L01_FINAL PACKET	.pdf	5/2/2016	Construction Jobsheets
SLR_Noble_CD Data Request 3_Noble Response_20180814	.xlsm	8/23/2018	Headspace Tank Confirmation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DIETRICH T4N-R64W-S7 L01_WALKDOWN	.pdf	5/2/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DIETRICH T4N-R64W-S7 L01_IR VERIFICATION	.pdf	4/27/2016	IR Verification Field Data Sheet
DIETRICH T4N-R64W-S7 L01_0915_NORMAL	.mp4	4/26/2016	IR Camera Video Normal Operations
DIETRICH T4N-R64W-S7 L01_0916_DUMP	.mp4	4/26/2016	IR Camera Video During Dump Event
DIETRICH T4N-R64W-S7 L01_0917_POST	.mp4	4/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DIETRICH T4N-R64W-S7 L01_SIGNED EVAL	.pdf	5/5/2106	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** DIETRICH T4N-R64W-S7 L01

**Consent Decree Tank System Number:** 623

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>7</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,017</b>	<b>10,090</b>	<b>12%</b>
Calculated Burner Capacity (scfh)	<b>4,110</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>37,259</b>	<b>62,607</b>	
Total VCS Capacity (scfh)	<b>41,369</b>	<b>67,207</b>	
VCS Capacity minus PPIVF (scfh)	<b>32,352</b>	<b>57,117</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/26/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DIETRICH T4N-R64W-S7 L01**

Consent Decree Tank System Number: **623**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>l</sup>	238	
Mscfd	40	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,664	951
Truck Loading Vapor	0	0
Total	10,090	9,017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DIETRICH T4N-R64W-S7 L01**

Consent Decree Tank System Number: **623**

**Audit Notes**

The walkdown checklist (DIETRICH T4N-R64W-S7 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (DIETRICH T4N-R64W-S7 L01\_FINAL PACKET).

The STEM work request form (DIETRICH T4N-R64W-S7 L01\_FINAL PACKET, p 3) requests the existing 212 oil dump valves to be replaced with 1" 1400 with 1/2" trim on both separators. The STEM retrofit walkdown checklist (DIETRICH T4N-R64W-S7 L01\_FINAL PACKET, p 5) A1 confirms the trim is consistent with the oil dump trim in the signed engineering eval (DIETRICH T4N-R64W-S7 L01\_SIGNED EVAL p, 2) The job sheet (DIETRICH T4N-R64W-S7 L01\_FINAL PACKET, P 22) does not mention updating the valves to 1" from 2". Therefore a 2" valve size was used in the model to be conservative.

The STEM work request form (DIETRICH T4N-R64W-S7 L01\_FINAL PACKET, p 3) requests that tanks #1, #4, and #7 be disconnected from the fill header to be used as headspace tanks. There is no confirmation in the job sheet (DIETRICH T4N-R64W-S7 L01\_FINAL PACKET, P 22) that this action was completed. Noble's response to the data request from 8/14/2018 stated "Field verification for this facility was completed on or around 3/30/16, field verification confirmed that three tanks were converted into headspace tanks (i.e. removed from liquid service but remained connected to vapor header)."

The STEM Engineering evaluation was completed with 4 tanks at 51% full. The data provided indicates there are 7 tanks on site. Therefore, the model should have been run with 7 tanks at 51% full instead of 4 tanks at 51% full. Running the model with 4 tanks at 51% filled caused an underestimation of both PPIVF and headspace capacity. The modeling guideline was not strictly followed but the engineering design guideline is still considered strictly followed.

This site was selected for IR camera inspection because the video pans over the VCS line too quickly to inspect for leaks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD SHABLE USX T7N-R64W-S11 L01**

Consent Decree Tank System Number: **2062**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DILLARD SHABLE USX T7N-R64W-S11 L01_FINAL PACKET	.pdf	8/3/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DILLARD SHABLE USX T7N-R64W-S11 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	1/10/2018	STEM Engineering Evaluation Spreadsheet
DILLARD SHABLE USX T7N-R64W-S11 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DILLARD SHABLE USX T7N-R64W-S11 L01_FINAL PACKET	.pdf	8/3/2015	Work Request
DILLARD SHABLE USX T7N-R64W-S11 L01_FINAL PACKET	.pdf	8/3/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DILLARD SHABLE USX T7N-R64W-S11 L01_WALKDOWN	.pdf	8/3/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DILLARD SHABLE USX T7N-R64W-S11 L01_IR VERIFICATION	.pdf	8/3/2015	IR Verification Field Data Sheet
DILLARD SHABLE USX T7N-R64W-S11 L01_0199_NORMAL	.mp4	7/31/2015	IR Camera Video Normal Operations
DILLARD SHABLE USX T7N-R64W-S11 L01_0200_DUMP	.mp4	7/31/2015	IR Camera Video During Dump Event
DILLARD SHABLE USX T7N-R64W-S11 L01_0201_POST	.mp4	7/31/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DILLARD SHABLE USX T7N-R64W-S11 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DILLARD SHABLE USX T7N-R64W-S11 L01**  
**Consent Decree Tank System Number:** **2062**

Yes  No Site Equipment/Emission Source Inventory Consistent Throughout Documentation?  
 Yes  No VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>16</b>
Oil Tank Capacity (bbbl):	<b>500</b>
# of Water Tanks:	<b>6</b>
Water Tank Capacity (bbbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>4"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9	Vessel 10
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9	Vessel 10
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
VRT Shut in Pressure (psig) **12**

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>6</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>99,075</b>	<b>103,469</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>8,142</b>	<b>35,000</b>	
Headspace Surge Capacity (scfh)	<b>259,429</b>	<b>259,429</b>	
Total VCS Capacity (scfh)	<b>267,571</b>	<b>294,429</b>	
VCS Capacity minus PPIVF (scfh)	<b>168,496</b>	<b>190,960</b>	

Yes  No Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.  
 Yes  No Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.  
 Yes  No Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).  
 Yes  No This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
Audit Document Review Date: 6/12/2018  
Audit Document Review Verified by: Chris Boggess  
Audit Document Verification Date: 11/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD SHABLE USX T7N-R64W-S11 L01**

Consent Decree Tank System Number: **2062**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9
Z1	-1.02	-1.02	-1.02	-1.02	-1.02				
Z2	-0.86	-0.86	-0.86	-0.86	-0.86				
Z3	0.98	0.98	0.98	0.98	0.98				
Z	-0.90	-0.90	-0.90	-0.90	-0.90				
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9	22.9	22.9				

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9
Valve Press Recovery Factor ( $C_F$ )	0.77	0.77	0.77	0.77	0.77				
Valve Coefficient (gpm/psi) ( $C_V$ )	21.25	21.25	21.25	21.25	21.25				
Critical Pressure (psia) <sup>b</sup>	833	833	833	833	833				
Vapor Pressure (psia) <sup>c</sup>	407	407	407	407	407				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76	0.76	0.76	0.76				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes				
Peak Flow (bopd) <sup>f,g</sup>	6905	6905	6905	6905	6905				

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9
Flash Flow (Mscfd)	158.2	158.2	158.2	158.2	158.2				
Working Flow (Mscfd) <sup>h,i</sup>	66	66	66	66	66				

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9
Valve Press Recovery Factor ( $C_F$ )	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Valve Coefficient (gpm/psi) ( $C_V$ )	21.25	21.25	21.25	21.25	21.25	21.25	21.25	21.25	21.25
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200	3200	3200	3200
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1	1	1	1
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak Flow (bwpd) <sup>f,g</sup>	11381	11381	11381	11381	11381	11381	11381	11381	11381

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9
Flash Flow (Mscfd)	46	46	46	46	46	46	46	46	46
Working Flow (Mscfd) <sup>l</sup>	64	64	64	64	64	64	64	64	64

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>i</sup>	396	396
Mscfd	152	57

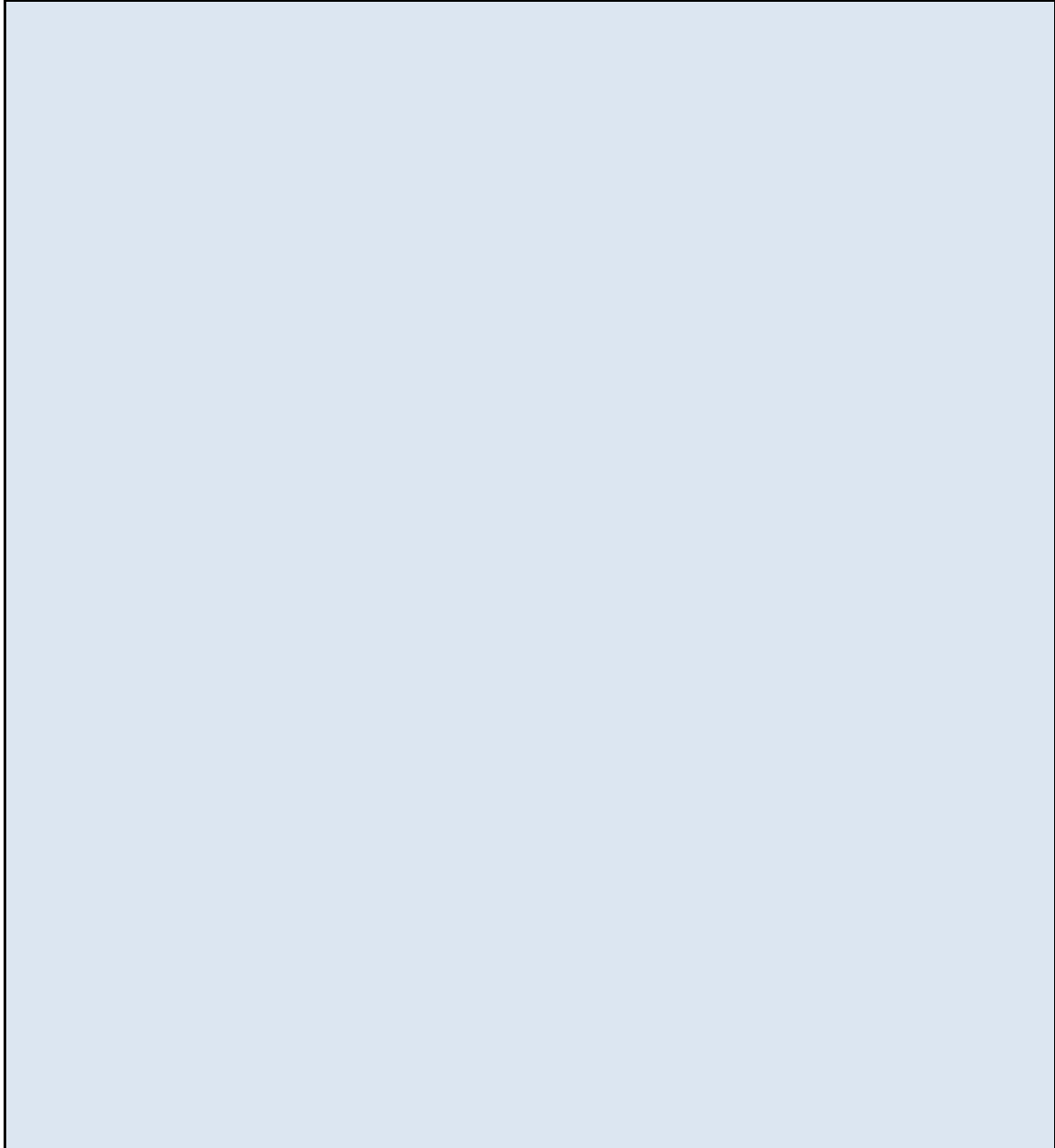
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	32,949	32,949
Oil Tank Working Rate	13,681	13,647
Water Tank Flash Rate	18,969	18,968
Water Tank Working Rate	26,626	26,625
Tank Breathing Rate	8,717	4,359
Truck Loading Vapor	2,527	2,527
<b>Total</b>	<b>103,469</b>	<b>99,075</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD SHABLE USX T7N-R64W-S11 L01**

Consent Decree Tank System Number: **2062**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD T8N-R64W-S34 L01**

Consent Decree Tank System Number: **1895**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DILLARD T8N-R64W-S34 L01_FINAL PACKET	.pdf	3/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DILLARD T8N-R64W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	6/3/2016	STEM Engineering Evaluation Spreadsheet
DILLARD T8N-R64W-S34 L01_SIGNED EVAL	.pdf	6/7/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DILLARD T8N-R64W-S34 L01_FINAL PACKET	.pdf	3/24/2016	Work Request
DILLARD T8N-R64W-S34 L01_FINAL PACKET	.pdf	3/24/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DILLARD T8N-R64W-S34 L01_WALKDOWN	.pdf	3/24/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DILLARD T8N-R64W-S34 L01_IR VERIFICATION	.pdf	3/22/2016	IR Verification Field Data Sheet
DILLARD T8N-R64W-S34 L01_0789_NORMAL	.mp4	3/21/2016	IR Camera Video Normal Operations
DILLARD T8N-R64W-S34 L01_0790_DUMP	.mp4	3/21/2016	IR Camera Video During Dump Event
DILLARD T8N-R64W-S34 L01_0791_POST	.mp4	3/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DILLARD T8N-R64W-S34 L01_SIGNED EVAL	.pdf	6/7/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD T8N-R64W-S34 L01**

Consent Decree Tank System Number: **1895**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>155</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>119</b>		

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>5,246</b>	<b>5,055</b>	<b>-4%</b>
Calculated Burner Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,452</b>	<b>5,737</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/12/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD T8N-R64W-S34 L01**

Consent Decree Tank System Number: **1895**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.60</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.71</b>							
Gas/Oil Ratio (scf/bbl)	<b>293.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.55</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>2.96</b>							
Critical Pressure (psia) <sup>b</sup>	<b>615</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>168</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>381</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>112.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>4,666</b>	<b>4,851</b>
Oil Tank Working Rate	<b>151</b>	<b>157</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,055</b>	<b>5,246</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD T8N-R64W-S34 L01**

Consent Decree Tank System Number: **1895**

**Audit Notes**

The stem work request form (PG 3 of Final Packet pdf) states for the pneumatic pshh to set the hp hi/lo no higher than 175 psig however nowhere in the job sheets (PGs 20-23) does it confirm this task was completed. The signed eval and stem engineering design form show the pressure to be set at 155 psig which is in line with "no greater than 175psig" however again, nowhere in the job sheets does it state that any pressure was set. Need to confirm the pneumatic pshh was set as requested in the work request

Noble provided a response to the above discrepancy on 11/14/2018 that states "Rework was completed on or around 8/12/2016, which decreased the HP separator pressure to no higher than 155 psig." Documentation of completed rework was also submitted for verification

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S3 L01**

Consent Decree Tank System Number: **1534**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L01_FINAL PACKET	.pdf	1/21/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
DILLARD USX T7N-R64W-S3 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L01_FINAL PACKET	.pdf	1/21/2016	Work Request
DILLARD USX T7N-R64W-S3 L01_FINAL PACKET	.pdf	1/21/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L01_WALKDOWN	.pdf	9/21/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L01_IR VERIFICATION	.pdf	9/18/2015	IR Verification Field Data Sheet
DILLARD USX T7N-R64W-S3 L01_0281_NORMAL	.mp4	9/17/2015	IR Camera Video Normal Operations
DILLARD USX T7N-R64W-S3 L01_0282_DUMP	.mp4	9/17/2015	IR Camera Video During Dump Event
DILLARD USX T7N-R64W-S3 L01_0283_POST	.mp4	9/17/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S3 L01**

Consent Decree Tank System Number: **1534**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>275</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>COMM 200 48"</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>157</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>16,611</b>	<b>16,612</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,738</b>	<b>11,142</b>	
Headspace Surge Capacity (scfh)	<b>13,286</b>	<b>13,286</b>	
Total VCS Capacity (scfh)	<b>21,024</b>	<b>24,428</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,413</b>	<b>7,815</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/12/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S3 L01**

Consent Decree Tank System Number: **1534**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>2.12</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>2.23</b>							
Gas/Oil Ratio (scf/bbl)	<b>682.1</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>2.17</b>							
Critical Pressure (psia) <sup>b</sup>	<b>722</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>288</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.78</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>560</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>382.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>5</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

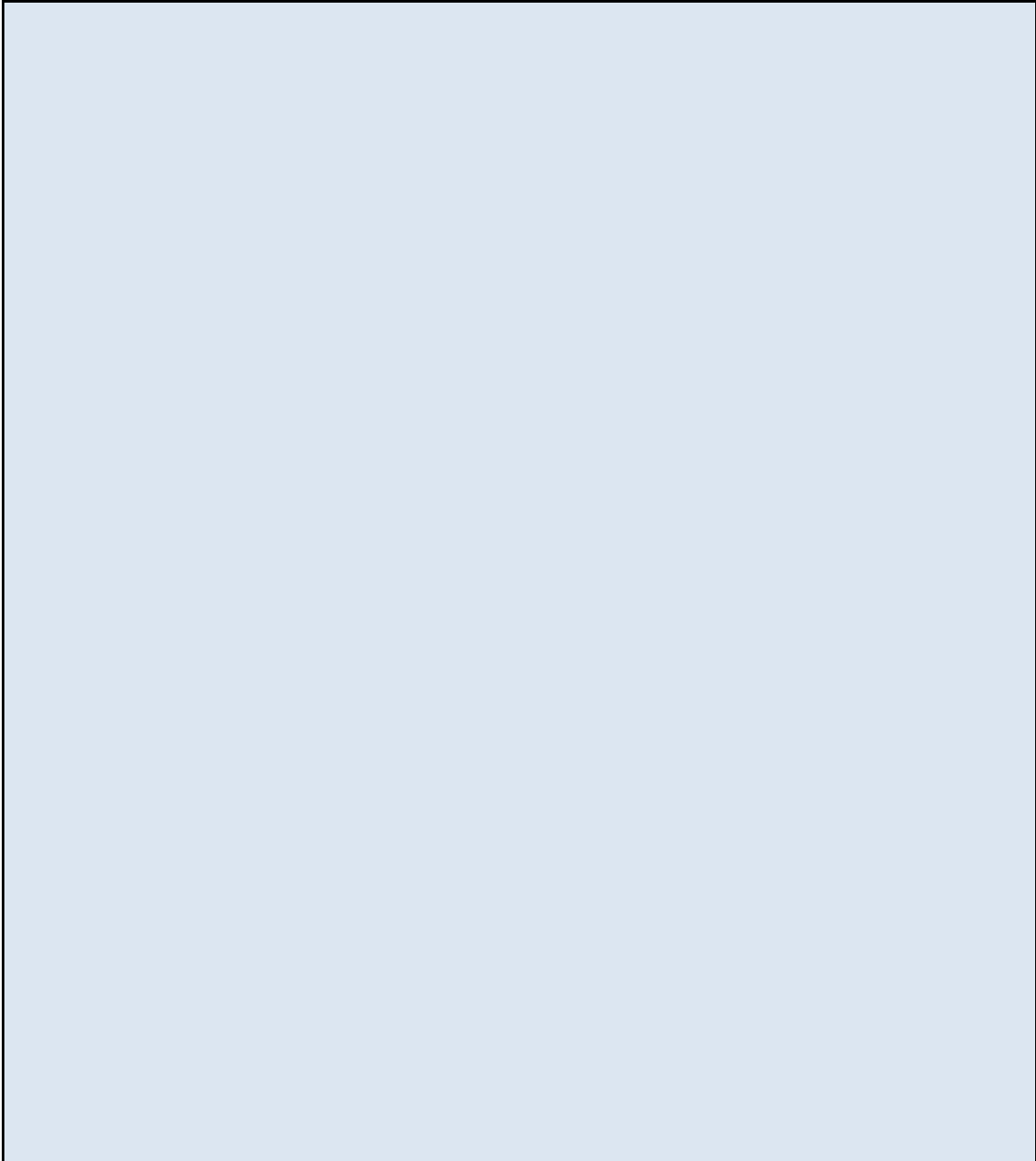
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>15,915</b>	<b>15,915</b>
Oil Tank Working Rate	<b>222</b>	<b>221</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>16,612</b>	<b>16,611</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S3 L01**

Consent Decree Tank System Number: **1534**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S3 L02**

Consent Decree Tank System Number: **575**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L02_FINAL PACKET	.pdf	1/20/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L02_STEM Engineering Evaluation_rev1	.xlsm	1/24/2018	STEM Engineering Evaluation Spreadsheet
DILLARD USX T7N-R64W-S3 L02_SIGNED EVAL	.pdf	1/25/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L02_FINAL PACKET	.pdf	1/20/2016	Work Request
DILLARD USX T7N-R64W-S3 L02_FINAL PACKET	.pdf	1/20/2016	Construction Jobsheets
DILLARD USX T7N-R64W-S3 L02_COMPLETED TLO	.pdf	5/3/2018	Truck Loadout

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L02_WALKDOWN	.pdf	9/29/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L02_IR VERIFICATION	.pdf	9/24/2015	IR Verification Field Data Sheet
DILLARD USX T7N-R64W-S3 L02_0275_NORMAL	.mp4	9/23/2015	IR Camera Video Normal Operations
DILLARD USX T7N-R64W-S3 L02_0276_DUMP	.mp4	9/23/2015	IR Camera Video During Dump Event
DILLARD USX T7N-R64W-S3 L02_0277_POST	.mp4	9/23/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S3 L02_SIGNED EVAL	.pdf	1/25/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S3 L02**

Consent Decree Tank System Number: **575**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>	<b>65</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>65</b>	<b>65</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>					

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,932</b>	<b>14,202</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>4,994</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>11,584</b>	<b>29,948</b>	
Total VCS Capacity (scfh)	<b>16,578</b>	<b>36,490</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,646</b>	<b>22,287</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 7/12/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/12/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S3 L02**

Consent Decree Tank System Number: **575**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69	0.69						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.81	0.81						
Gas/Oil Ratio (scf/bbl)	104.5	104.5						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	7.20						
Critical Pressure (psia) <sup>b</sup>	535	535						
Vapor Pressure (psia) <sup>c</sup>	78	78						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	760	794						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4	82.9						
Working Flow (Mscfd) <sup>h,i</sup>	7	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.94	0.78					
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	5.72	7.20					
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200					
Vapor Pressure (psia) <sup>k</sup>	1	1	1					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96					
Choked Flow? <sup>e</sup>	Yes	No	Yes					
Peak Flow (bwpd) <sup>f,g</sup>	3906	1581	1685					

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	16	6	7					
Working Flow (Mscfd) <sup>l</sup>	22	9	9					

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	23	11

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,760	6,613
Oil Tank Working Rate	615	601
Water Tank Flash Rate	1,195	1,150
Water Tank Working Rate	1,678	1,615
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	2,527	2,527
Total	14,202	13,932



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S3 L02**

Consent Decree Tank System Number: **575**

**Audit Notes**

It is unknown whether the Modeling Guidance was correctly applied with unconfirmed water or oil valve body size. The field data indicates the oil and water valves on the existing separators are 2" bodied valves. There is no indication in the Job Sheet that the valve bodies were modified; Job Sheet only indicates the trims were reduced to 1/2" per the work request.

An oil storage tank was removed from production services as part of the truck vent capture work requested 8/17/16. The Engineering Evaluation did not account for this tank in vapor space service. Audit evaluation was completed with 3 oil tanks and 2 water tanks in production service and 1 tank in vapor space service.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S5 L01**

Consent Decree Tank System Number: **1607/1608**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_FINAL PACKET	.pdf	1/3/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_STEM Engineering Evaluation_rev1_with	.xlsm	6/27/2017	STEM Engineering Evaluation Spreadsheet
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_SIGNED EVAL	.pdf	7/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_FINAL PACKET	.pdf	1/3/2018	Work Request
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_FINAL PACKET	.pdf	1/3/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_WALKDOWN	.pdf	9/21/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_IR VERIFICATION	.pdf	9/18/2015	IR Verification Field Data Sheet
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_0275_NORMAL	.mp4	9/17/2015	IR Camera Video Normal Operations
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_0276_DUMP	.mp4	9/17/2015	IR Camera Video During Dump Event
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_0277_POST	.mp4	9/17/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02_SIGNED EVAL	.pdf	7/12/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S5 L01**

Consent Decree Tank System Number: **1607/1608**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,989</b>	<b>15,991</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,127</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>27,512</b>	<b>27,512</b>	
Total VCS Capacity (scfh)	<b>30,639</b>	<b>39,179</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,650</b>	<b>23,188</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 12/13/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S5 L01**

Consent Decree Tank System Number: **1607/1608**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>15,991</b>	<b>15,989</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DILLARD USX T7N-R64W-S5 L01**

Consent Decree Tank System Number: **1607/1608**

**Audit Notes**

Increasing the KO to burner line from 2" to 4" could NOT be confirmed in the documentation. FDS indicate the size of the line from the KO to the burner is 2". There is no verification 4" line installed from KO to burner as requested on the work request. The signed evaluation indicates this line size is 4". On 12/10/18 Noble responded to a data request "Field verification on 8/18/15 confirmed the installation of a 4" line from KO to burner."

Surge Vessels: Final Packet shows no headspace tanks to be used; Signed Eval pp 2 shows 1 headspace tank. STEM Eng Evaluation Rev 1 shows 1 headspace tank in design. On 12/10/18 Noble responded to a data request with a file named "230\_DILLARD USX T7N-R64W-S5 L01 & DILLARD USX T7N-R64W-S9 L02 TLO Final Packet." The file confirmed that one tank was disconnected from fill header for headspace use. 4 oil tanks remain on site.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINGES EGGE T6N-R64W-S3 L01**

Consent Decree Tank System Number: **1764/588/1495**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3 L01_FINAL	.pdf	3/23/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3 L01_STEM	.xlsm	8/27/2018	STEM Engineering Evaluation Spreadsheet
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3 L01_SIGNED EVAL	.pdf	3/30/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3 L01_FINAL	.pdf	3/23/2017	Work Request
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3 L01_FINAL	.pdf	3/23/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3	.pdf	3/23/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3 L01_IR	.pdf	3/22/2017	IR Verification Field Data Sheet
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3	.mp4	3/22/2017	IR Camera Video Normal Operations
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3	.mp4	3/22/2017	IR Camera Video During Dump Event
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3 L01_1883_POST	.mp4	3/22/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DINGES EGGE T6N-R64W-S3 L01 & RODRIGUEZ T6N-R64W-S3 L01 & VALCAR T6N-R64W-S3 L01_SIGNED	.pdf	3/30/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINGES EGGE T6N-R64W-S3 L01**

Consent Decree Tank System Number: **1764/588/1495**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>11,793</b>	<b>11,793</b>	
Total VCS Capacity (scfh)	<b>15,974</b>	<b>16,393</b>	
VCS Capacity minus PPIVF (scfh)	<b>11,466</b>	<b>11,884</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 8/28/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/1/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINGES EGGE T6N-R64W-S3 L01**

Consent Decree Tank System Number: **1764/588/1495**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>l</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

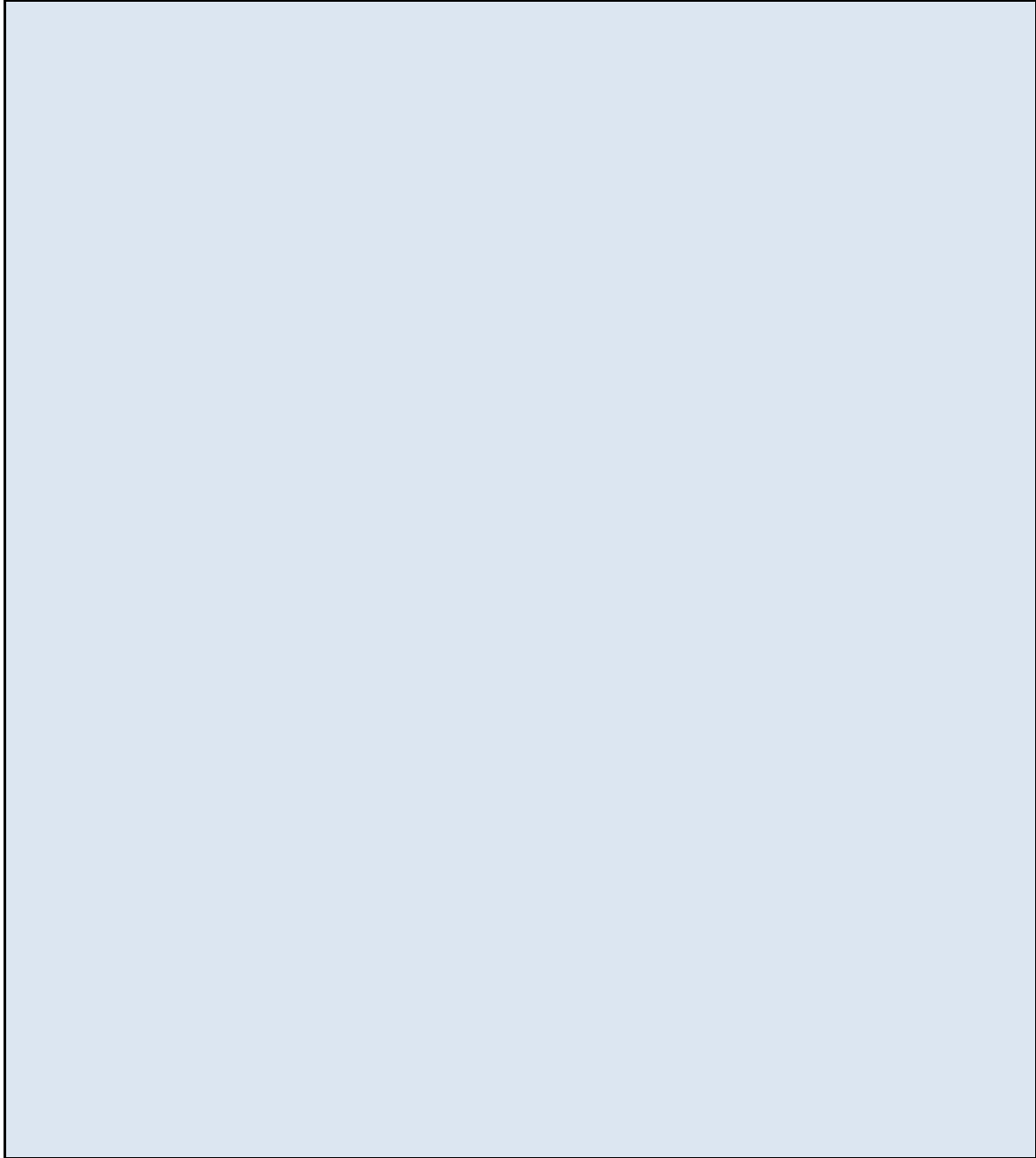


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINGES EGGE T6N-R64W-S3 L01**

Consent Decree Tank System Number: 1764/588/1495

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNEL T4N-R64W-S26 L02**

Consent Decree Tank System Number: **492**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L02_FINAL PACKET	.pdf	10/26/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L02_STEM Engineering Evaluation_rev1	.xlsm	12/20/2016	STEM Engineering Evaluation Spreadsheet
DINNEL T4N-R64W-S26 L02_SIGNED EVAL	.pdf	1/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L02_FINAL PACKET	.pdf	10/26/2015	Work Request
DINNEL T4N-R64W-S26 L02_FINAL PACKET	.pdf	10/26/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L02_WALKDOWN	.pdf	10/26/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L02_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
DINNEL T4N-R64W-S26 L02_0370_NORMAL	.mp4	10/21/2015	IR Camera Video Normal Operations
DINNEL T4N-R64W-S26 L02_0371_DUMP	.mp4	10/21/2015	IR Camera Video During Dump Event
DINNEL T4N-R64W-S26 L02_0372_POST	.mp4	10/21/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L02_SIGNED EVAL	.pdf	1/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DINNEL T4N-R64W-S26 L02**

**Consent Decree Tank System Number:** **492**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,269</b>	<b>2,024</b>	
Total VCS Capacity (scfh)	<b>6,450</b>	<b>6,624</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,942</b>	<b>2,115</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/6/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNEL T4N-R64W-S26 L02**

Consent Decree Tank System Number: **492**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNEL T4N-R64W-S26 L02**

Consent Decree Tank System Number: **492**

**Audit Notes**

The NEI Engineering Evaluation was completed with a 3" line from the Tanks to KO drum. The field data sheet indicated the line on the top of the tanks to the KO drum was a 2" line. The work request does not indicate this is to be modified, nor does the job sheet indicate this segment of piping was modified. The Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNEL T4N-R64W-S26 L03**

Consent Decree Tank System Number: **491**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L03_FINAL PACKET	.pdf	3/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L03_STEM Engineering Evaluation_rev1	.xlsm	3/20/2017	STEM Engineering Evaluation Spreadsheet
DINNEL T4N-R64W-S26 L03_SIGNED EVAL	.pdf	3/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L03_FINAL PACKET	.pdf	3/20/2017	Work Request
DINNEL T4N-R64W-S26 L03_FINAL PACKET	.pdf	3/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L03_WALKDOWN	.pdf	3/20/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L03_IR VERIFICATION	.pdf	3/17/2017	IR Verification Field Data Sheet
DINNEL T4N-R64W-S26 L03_1372_NORMAL	.mp4	3/13/2017	IR Camera Video Normal Operations
DINNEL T4N-R64W-S26 L03_1373_DUMP	.mp4	3/13/2017	IR Camera Video During Dump Event
DINNEL T4N-R64W-S26 L03_1374_POST	.mp4	3/13/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DINNEL T4N-R64W-S26 L03_SIGNED EVAL	.pdf	3/23/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** DINNEL T4N-R64W-S26 L03

**Consent Decree Tank System Number:** 491

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>120</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>10,346</b>	<b>10,348</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>23,263</b>	<b>23,263</b>	
Total VCS Capacity (scfh)	<b>26,815</b>	<b>27,863</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,469</b>	<b>17,515</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/10/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNEL T4N-R64W-S26 L03**

Consent Decree Tank System Number: **491**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.34</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.46</b>							
Gas/Oil Ratio (scf/bbl)	<b>209.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>584</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>133</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1080</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>226.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>10</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>9,444</b>	<b>9,444</b>
Oil Tank Working Rate	<b>428</b>	<b>427</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>10,348</b>	<b>10,346</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNEL T4N-R64W-S26 L03**

Consent Decree Tank System Number: **491**

**Audit Notes**

The stem work request form (PG 3 of Final Packet pdf) states to set pneumatic pshh HP Hi/Lo no higher than 120 psig; however, nowhere in the job sheets (PGs 19-23 of the Final Packet) does it confirm this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 5), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 120 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNER T6N-R65W-S14 L03**

Consent Decree Tank System Number: **1725**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S14 L03_FINAL PACKET	pdf	9/18/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S14 L03_SIGNED EVAL	pdf	7/22/2016	Final Signed Engineering Evaluation
DINNER T6N-R65W-S14 L03_STEM Engineering Evaluation_rev1	xlsm	9/18/2017	STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S14 L03_FINAL PACKET	pdf	9/18/2017	Work Request
DINNER T6N-R65W-S14 L03_FINAL PACKET	pdf	9/18/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S14 L03_WALKDOWN	pdf	7/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S14 L03_1269_NORMAL	mp4	7/11/2016	IR Camera Video Normal Operations
DINNER T6N-R65W-S14 L03_1270_DUMP	mp4	7/11/2016	IR Camera Video During Dump Event
DINNER T6N-R65W-S14 L03_1271_POST	mp4	7/11/2016	IR Camera Video Post Dump Event
DINNER T6N-R65W-S14 L03_IR VERIFICATION	pdf	7/11/2016	IR Verification Field Data Sheet

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S14 L03_SIGNED EVAL	pdf	7/22/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** DINNER T6N-R65W-S14 L03

**Consent Decree Tank System Number:** 1725

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,244</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>2,489</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>20,778</b>	<b>20,940</b>	
Total VCS Capacity (scfh)	<b>23,267</b>	<b>26,773</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,759</b>	<b>22,530</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNER T6N-R65W-S14 L03**

Consent Decree Tank System Number: **1725**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,454</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,244</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNER T6N-R65W-S14 L03**

Consent Decree Tank System Number: **1725**

**Audit Notes**

**1. Additional tanks onsite**

Aerial Photos, pg 10 of Final Packet, as well as provided IR camera video show additional tanks onsite which are not referenced in the Signed Eval. It is assumed these tanks have a separate vapor control system and not within the scope of the Dinner T6N-R64W-S14 L03 review.

**2. PPIVFR overestimated**

Modeling Guideline overestimates PPIVFR. Separator maximum pressure of 70 psig used in the Signed Eval, while QC Stem Checkout, pg 25 of Final Packet, indicates actual set point of 65 psig. Overly conservative estimate, not a deficiency of the modeling guideline.

**3. VCS capacity underestimated**

Engineering Design underestimates VCS capacity. Field datasheet, pg 16 of Final Packet, indicates 3" VOC line from header to burner, while Signed Eval used 2" diameter VOC line. Overly conservative estimate, not a deficiency of the engineering design standard.

**4. Oil dump valve size could not be verified**

Job Sheet, pg 27 of Final Packet, confirms a D-Grade 270# LP separator was installed onsite and the oil dump trim size is 1/2". No documentation is provided to show what size dump valve was installed on the separator. A 1" valve size was used in STEM Engineering Evaluation. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**5. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 12-17) are not dated. Assumed the date is the same as Facility Scouting date (4/18/16).

**6. Inconsistencies with Walkdown Checklist, pg 7 of Final Packet**

Item C13 of the Walkdown Checklist, pg 7 of Final Packet, indicates the tank fill lines are configured to enable the LP separator to produce into all tanks. Two (2) oil tanks are onsite, one of which was "bottomed out" for use as a headspace tank according to the Job Sheet, pg 27 of Final Packet. The walkdown checklist was therefore not used as verification of site modifications.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNER T6N-R65W-S24 L01**

Consent Decree Tank System Number: **1955**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S24 L01_FINAL PACKET	.pdf	5/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S24 L01_STEM Engineering Evaluation_rev1	.xls	5/27/2016	STEM Engineering Evaluation Spreadsheet
DINNER T6N-R65W-S24 L01_Final Signed STEM Plan	.pdf	7/25/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S24 L01_FINAL PACKET	.pdf	5/26/2016	Work Request
DINNER T6N-R65W-S24 L01_FINAL PACKET	.pdf	5/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S24 L01_WALKDOWN	.pdf	5/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S24 L01_IR VERIFICATION	.pdf	5/25/2016	IR Verification Field Data Sheet
DINNER T6N-R65W-S24 L01_0941_NORMAL	.mp4	5/25/2016	IR Camera Video Normal Operations
DINNER T6N-R65W-S24 L01_0942_DUMP	.mp4	5/25/2016	IR Camera Video During Dump Event
DINNER T6N-R65W-S24 L01_0944_POST	.mp4	5/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DINNER T6N-R65W-S24 L01_SIGNED EVAL	.pdf	5/31/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNER T6N-R65W-S24 L01**

Consent Decree Tank System Number: **1955**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>65</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,786</b>	<b>13,788</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,349</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>12,316</b>	<b>12,316</b>	
Total VCS Capacity (scfh)	<b>18,665</b>	<b>22,749</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,879</b>	<b>8,961</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS

Audit Document Review Date: 3/26/2018

Audit Document Review Verified by: Jesse Hanshaw

Audit Document Verification Date: 5/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DINNER T6N-R65W-S24 L01**

Consent Decree Tank System Number: **1955**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.80</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1379</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>144.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>13</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>11381</b>	<b>4910</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>46</b>	<b>20</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>64</b>	<b>28</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>11</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,002</b>	<b>6,002</b>
Oil Tank Working Rate	<b>546</b>	<b>545</b>
Water Tank Flash Rate	<b>2,715</b>	<b>2,715</b>
Water Tank Working Rate	<b>3,811</b>	<b>3,811</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>13,788</b>	<b>13,786</b>

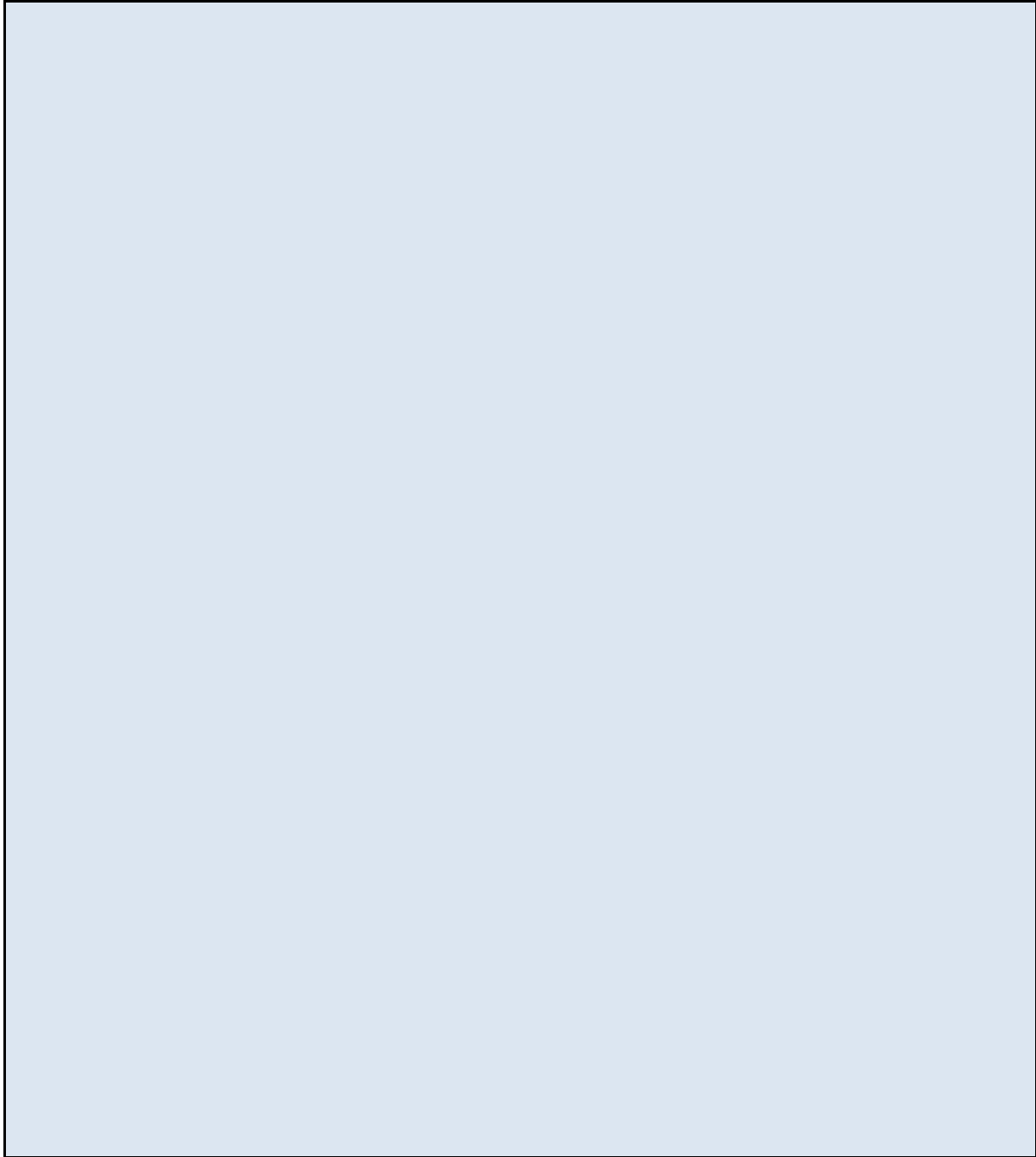


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: DINNER T6N-R65W-S24 L01

Consent Decree Tank System Number: 1955

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DONOVAN BOOTH T3N-R64W-S2 L01**

Consent Decree Tank System Number: **499**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
DONOVAN BOOTH T3N-R64W-S2 L01_FINAL PACKET	.pdf	2/29/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
DONOVAN BOOTH T3N-R64W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	4/24/2017	STEM Engineering Evaluation Spreadsheet
DONOVAN BOOTH T3N-R64W-S2 L01_SIGNED EVAL	.pdf	4/24/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
DONOVAN BOOTH T3N-R64W-S2 L01_FINAL PACKET	.pdf	3/2/2016	Work Request
DONOVAN BOOTH T3N-R64W-S2 L01_FINAL PACKET	.pdf	3/28/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
DONOVAN BOOTH T3N-R64W-S2 L01_WALKDOWN	.pdf	4/18/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
DONOVAN BOOTH T3N-R64W-S2 L01_IR VERIFICATION	.pdf	4/18/2017	IR Verification Field Data Sheet
DONOVAN BOOTH T3N-R64W-S2 L01_1956_NORMAL	.mp4	4/18/2017	IR Camera Video Normal Operations
DONOVAN BOOTH T3N-R64W-S2 L01_1958_DUMP	.mp4	4/18/2017	IR Camera Video During Dump Event
DONOVAN BOOTH T3N-R64W-S2 L01_1959_POST	.mp4	4/18/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
DONOVAN BOOTH T3N-R64W-S2 L01_SIGNED EVAL	.pdf	4/24/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DONOVAN BOOTH T3N-R64W-S2 L01**

Consent Decree Tank System Number: **499**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,394</b>	<b>2,394</b>	
Total VCS Capacity (scfh)	<b>6,575</b>	<b>6,994</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,067</b>	<b>2,485</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/9/2017

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DONOVAN BOOTH T3N-R64W-S2 L01**

Consent Decree Tank System Number: **499**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (k)	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (k)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	11	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DONOVAN BOOTH T3N-R64W-S2 L01**

Consent Decree Tank System Number: **499**

**Audit Notes**

Field Datasheet (DONOVAN BOOTH T3N-R64W-S2 L01\_FINAL PACKET p 12) lists no date but data makes sense with other documentation. Assuming Field Datasheet was completed prior to any changes on site.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DOVE DURYE SARCHET T3N-R65W-S22 L01**

**Consent Decree Tank System Number:** **2137**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DONOVAN BOOTH T3N-R64W-S2 L01_FINAL PACKET	.pdf	5/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DOVE DURYE SARCHET T3N-R65W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	11/22/2016	STEM Engineering Evaluation Spreadsheet
DOVE DURYE SARCHET T3N-R65W-S22 L01_SIGNED EVAL	.pdf	11/30/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DOVE DURYE SARCHET T3N-R65W-S22 L01_FINAL PACKET	.pdf	7/19/2016	Work Request
DOVE DURYE SARCHET T3N-R65W-S22 L01_FINAL PACKET	.pdf	9/6/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DOVE DURYE SARCHET T3N-R65W-S22 L01_WALKDOWN	.pdf	11/21/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DOVE DURYE SARCHET T3N-R65W-S22 L01_IR VERIFICATION	.pdf	11/21/2016	IR Verification Field Data Sheet
DOVE DURYE SARCHET T3N-R65W-S22 L01_1729_NORMAL	.mp4	11/21/2016	IR Camera Video Normal Operations
DOVE DURYE SARCHET T3N-R65W-S22 L01_1730_DUMP	.mp4	11/21/2016	IR Camera Video During Dump Event
DOVE DURYE SARCHET T3N-R65W-S22 L01_1731_POST	.mp4	11/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DOVE DURYE SARCHET T3N-R65W-S22 L01_SIGNED EVAL	.pdf	11/30/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DOVE DURYE SARCHET T3N-R65W-S22 L01**

**Consent Decree Tank System Number:** **2137**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>422</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,449</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,005</b>	<b>1,371</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 3/30/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/26/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DOVE DURYE SARCHET T3N-R65W-S22 L01**

Consent Decree Tank System Number: **2137**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>



## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DOVE DURYEA SARCHET T3N-R65W-S22 L01**

Consent Decree Tank System Number: **2137**

### Audit Notes

Job Sheet (DOVE DURYEA SARCHET T3N-R65W-S22 L01\_FINAL PACKET p 43) indicates that previous underground VOC line was abandoned but does not indicate installation of new line or new line diameter. An above ground line is visible connecting to the combustor in the IR video footage. Noble responded to a data request on 2/20/2018 stating "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 9), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 2), and the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 17) provide consistent documentation that the above ground 4" vapor line for tank vapors was installed as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.'" This serves as confirmation that the above ground line is 4" in diameter.

LP separator oil leg dump valve size not specified. Assuming largest Kimray valve available with 1/2" trim specified in Engineering Evaluation (DOVE DURYEA SARCHET T3N-R65W-S22 L01\_SIGNED EVAL). It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DPG BIRD FARM T5N-R65W-S1 L02**

Consent Decree Tank System Number: **223**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DPG BIRD FARM T5N-R65W-S1 L02_FINAL PACKET	.pdf	1/3/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DPG BIRD FARM T5N-R65W-S1 L02_STEM Engineering Evaluation_rev1	.xlsm	1/17/2017	STEM Engineering Evaluation Spreadsheet
DPG BIRD FARM T5N-R65W-S1 L02_SIGNED EVAL	.pdf	1/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DPG BIRD FARM T5N-R65W-S1 L02_FINAL PACKET	.pdf	1/3/2017	Work Request
DPG BIRD FARM T5N-R65W-S1 L02_FINAL PACKET	.pdf	1/3/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DPG BIRD FARM T5N-R65W-S1 L02_WALKDOWN	.pdf	1/3/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DPG BIRD FARM T5N-R65W-S1 L02_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
DPG BIRD FARM T5N-R65W-S1 L02_1827_NORMAL	.mp4	12/28/2016	IR Camera Video Normal Operations
DPG BIRD FARM T5N-R65W-S1 L02_1828_DUMP	.mp4	12/28/2016	IR Camera Video During Dump Event
DPG BIRD FARM T5N-R65W-S1 L02_1829_POST	.mp4	12/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DPG BIRD FARM T5N-R65W-S1 L02_SIGNED EVAL	.pdf	1/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** DPG BIRD FARM T5N-R65W-S1 L02

**Consent Decree Tank System Number:** 223

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,785</b>	<b>1,785</b>	
Total VCS Capacity (scfh)	<b>5,874</b>	<b>6,385</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,193</b>	<b>2,702</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/26/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 8/8/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DPG BIRD FARM T5N-R65W-S1 L02**

Consent Decree Tank System Number: **223**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DPG BIRD FARM T5N-R65W-S1 L02**

Consent Decree Tank System Number: **223**

**Audit Notes**

The walkdown checklist (DPG BIRD FARM T5N-R65W-S1 L02\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (DPG BIRD FARM T5N-R65W-S1 L02\_FINAL PACKET).

The jobsheet noted that they "Tied 4" AGL in to Existing Tornado burner." This was not in the work request. The 4" line is larger than the 3" in the signed eval so this still meets the Engineering Design Standard.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR JOE T4N-R63W-S6 L01**  
 Consent Decree Tank System Number: **1332**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L01_FINAL PACKET	.pdf	1/25/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L01_STEM Engineering Evaluation_rev1	.xlsm	1/30/2017	STEM Engineering Evaluation Spreadsheet
DR JOE T4N-R63W-S6 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L01_FINAL PACKET	.pdf	1/25/2017	Work Request
DR JOE T4N-R63W-S6 L01_FINAL PACKET	.pdf	1/25/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L01_WALKDOWN	.pdf	1/25/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L01_IR VERIFICATION	.pdf	4/6/2018	IR Verification Field Data Sheet
DR JOE T4N-R63W-S6 L01_1273_NORMAL	.mp4	1/19/2017	IR Camera Video Normal Operations
DR JOE T4N-R63W-S6 L01_1274_DUMP	.mp4	1/19/2017	IR Camera Video During Dump Event
DR JOE T4N-R63W-S6 L01_1275_POST	.mp4	1/19/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR JOE T4N-R63W-S6 L01**

Consent Decree Tank System Number: **1332**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>120</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>119</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,618</b>	<b>5,618</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,080</b>	<b>5,174</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/20/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/26/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR JOE T4N-R63W-S6 L01**

Consent Decree Tank System Number: **1332**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.34</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.46</b>							
Gas/Oil Ratio (scf/bbl)	<b>209.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>584</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>133</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>589</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>123.5</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>6</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>5,147</b>	<b>5,147</b>
Oil Tank Working Rate	<b>233</b>	<b>233</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,618</b>	<b>5,618</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR JOE T4N-R63W-S6 L01**

Consent Decree Tank System Number: **1332**

**Audit Notes**

The walkdown checklist (DR JOE T4N-R63W-S6 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (DR JOE T4N-R63W-S6 L01\_FINAL PACKET)

The separator pneumatic PSHH is set by the operator not automation and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 120 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Noble did not claim any headspace surge capacity in the signed evaluation so the Engineering Design Standard was still applied correctly.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR JOE T4N-R63W-S6 L02**

Consent Decree Tank System Number: **1486**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L02_FINAL PACKET	.pdf	1/21/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L02_STEM Engineering Evaluation_rev1	.xls	12/20/2016	STEM Engineering Evaluation Spreadsheet
DR JOE T4N-R63W-S6 L02_Final Signed STEM Plan	.pdf	1/24/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L02_FINAL PACKET	.pdf	1/21/2016	Work Request
DR JOE T4N-R63W-S6 L02_FINAL PACKET	.pdf	1/21/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L02_WALKDOWN	.pdf	1/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L02_IR VERIFICATION	.pdf	1/6/2016	IR Verification Field Data Sheet
DR JOE T4N-R63W-S6 L02_0085_NORMAL	.mp4	1/6/2016	IR Camera Video Normal Operations
DR JOE T4N-R63W-S6 L02_0086_DUMP	.mp4	1/6/2016	IR Camera Video During Dump Event
DR JOE T4N-R63W-S6 L02_0087_POST	.mp4	1/6/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DR JOE T4N-R63W-S6 L02_SIGNED EVAL	.pdf	1/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR JOE T4N-R63W-S6 L02**

Consent Decree Tank System Number: **1486**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,811</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>774</b>	<b>774</b>	
Total VCS Capacity (scfh)	<b>4,585</b>	<b>5,327</b>	
VCS Capacity minus PPIVF (scfh)	<b>740</b>	<b>1,482</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS

Audit Document Review Date: 3/19/2018

Audit Document Review Verified by: Craig Bock

Audit Document Verification Date: 8/28/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR JOE T4N-R63W-S6 L02**

Consent Decree Tank System Number: **1486**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	6	

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	3,845	3,845

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR JOE T4N-R63W-S6 L02**

Consent Decree Tank System Number: **1486**

**Audit Notes**

The walkdown checklist was not marked complete.

CB - All notes and documentation support the Engineering Evaluation results. No additional information is needed for this facility.

This site was an alternate site selected for IR Camera Inspection based upon its system pressure group ( $\geq 186$ ,  $< 233$ )

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR PETERSON T5N-R64W-S10 L01**

Consent Decree Tank System Number: **1071**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DR PETERSON T5N-R64W-S10 L01_FINAL PACKET	.pdf	10/5/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DR PETERSON T5N-R64W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	1/12/2018	STEM Engineering Evaluation Spreadsheet
DR PETERSON T5N-R64W-S10 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DR PETERSON T5N-R64W-S10 L01_FINAL PACKET	.pdf	10/5/2015	Work Request
DR PETERSON T5N-R64W-S10 L01_FINAL PACKET	.pdf	10/5/2015	Construction Jobsheets
216_DR PETERSON T5N-R64W-S10 L01_REWORK	.pdf	11/14/2018	PSHH Reset

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DR PETERSON T5N-R64W-S10 L01_WALKDOWN	.pdf	10/5/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DR PETERSON T5N-R64W-S10 L01_IR VERIFICATION	.pdf	10/2/2015	IR Verification Field Data Sheet
DR PETERSON T5N-R64W-S10 L01_0310_NORMAL	.mp4	10/1/2015	IR Camera Video Normal Operations
DR PETERSON T5N-R64W-S10 L01_0311_DUMP	.mp4	10/1/2015	IR Camera Video During Dump Event
DR PETERSON T5N-R64W-S10 L01_0312_POST	.mp4	10/1/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DR PETERSON T5N-R64W-S10 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** DR PETERSON T5N-R64W-S10 L01

**Consent Decree Tank System Number:** 1071

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	2 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	2" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	TEC 4-CS (48" Tornado)			
Number of Units	1			
Man. Capacity (MSCFD)	110.4			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,068	3,195	4%
Calculated Burner Capacity (scfh)	3,195	4,600	
Headspace Surge Capacity (scfh)	253	0	
Total VCS Capacity (scfh)	3,448	4,600	
VCS Capacity minus PPIVF (scfh)	380	1,405	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/26/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR PETERSON T5N-R64W-S10 L01**

Consent Decree Tank System Number: **1071**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,068</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DR PETERSON T5N-R64W-S10 L01**

Consent Decree Tank System Number: **1071**

**Audit Notes**

The walkdown checklist (DR PETERSON T5N-R64W-S10 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (DR PETERSON T5N-R64W-S10 L01\_FINAL PACKET).

The STEM work request form (DR PETERSON T5N-R64W-S10 L01\_FINAL PACKET, p 3) requests that the LP pressure switch be set to 65 psig. An email from the final packet (DR PETERSON T5N-R64W-S10 L01\_FINAL PACKET, p 24) and the QC Stem checkout form (DR PETERSON T5N-R64W-S10 L01\_FINAL PACKET, p 25) confirm the LP pressure switch was set at 65 psig. The signed evaluation (DR PETERSON T5N-R64W-S10 L01\_SIGNED EVAL) was run with the LP pressure at 55 psig. The data request response (216\_DR PETERSON T5N-R64W-S10 L01\_REWORK) confirmed the PSHH was set to 55 psig on 10/7/2015.

The STEM work request form (DR PETERSON T5N-R64W-S10 L01\_FINAL PACKET, p 3) requests that a new LP Separator be installed on the site. The job sheet (DR PETERSON T5N-R64W-S10 L01\_FINAL PACKET, p 19) confirmed the installation of a new B grade 300# LP surge vessel. A1 of the walkdown checklist (DR PETERSON T5N-R64W-S10 L01\_WALKDOWN, p 1) confirms the 1/2" trim, however there is no confirmation of the valve size. Therefore a 2" valve was used in the model to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The tank system consists of a single oil tank. The signed evaluation (DR PETERSON T5N-R64W-S10 L01\_SIGNED EVAL) states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DYER USX T6N-R64W-S5 L01**

Consent Decree Tank System Number: **1951**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DYER USX T6N-R64W-S5 L01_FINAL PACKET	.pdf	11/18/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T6N-R64W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	6/27/2017	STEM Engineering Evaluation Spreadsheet
DYER USX T6N-R64W-S5 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T6N-R64W-S5 L01_FINAL PACKET	.pdf	11/18/2015	Work Request
DYER USX T6N-R64W-S5 L01_FINAL PACKET	.pdf	11/18/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T6N-R64W-S5 L01_FINAL PACKET	.pdf	11/18/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T6N-R64W-S5 L01_IR VERIFICATION	.pdf	11/17/2015	IR Verification Field Data Sheet
DYER USX T6N-R64W-S5 L01_0447_NORMAL	.mp4	11/16/2015	IR Camera Video Normal Operations
DYER USX T6N-R64W-S5 L01_0448_DUMP	.mp4	11/16/2015	IR Camera Video During Dump Event
DYER USX T6N-R64W-S5 L01_0449_POST	.mp4	11/16/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T6N-R64W-S5 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DYER USX T6N-R64W-S5 L01**

Consent Decree Tank System Number: **1951**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,436</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,812</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,812</b>	<b>4,553</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,376</b>	<b>2,117</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/29/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DYER USX T6N-R64W-S5 L01**

Consent Decree Tank System Number: **1951**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>431</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>48.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,027</b>	<b>2,027</b>
Oil Tank Working Rate	<b>171</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,436</b>	<b>2,436</b>

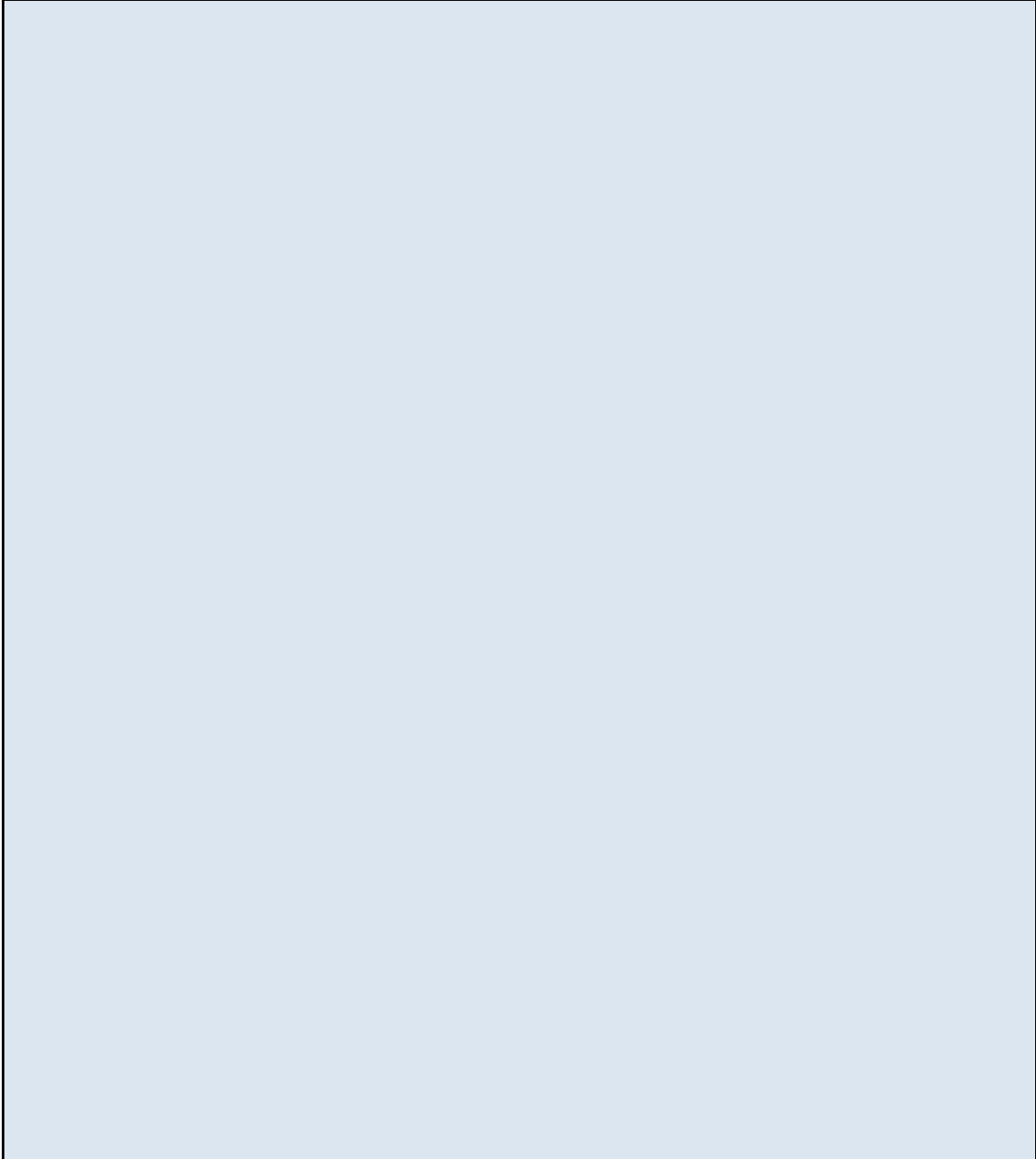


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DYER USX T6N-R64W-S5 L01**

Consent Decree Tank System Number: **1951**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DYER USX T7N-R64W-S34 L01**

Consent Decree Tank System Number: **597**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
DYER USX T7N-R64W-S34 L01_FINAL PACKET	.pdf	8/19/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T7N-R64W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	1/11/2018	STEM Engineering Evaluation Spreadsheet
DYER USX T7N-R64W-S34 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T7N-R64W-S34 L01_FINAL PACKET	.pdf	8/19/2015	Work Request
DYER USX T7N-R64W-S34 L01_FINAL PACKET	.pdf	8/19/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T7N-R64W-S34 L01_WALKDOWN	.pdf	8/19/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T7N-R64W-S34 L01_IR VERIFICATION	.pdf	8/19/2015	IR Verification Field Data Sheet
DYER USX T7N-R64W-S34 L01_0229_NORMAL	.mp4	8/17/2015	IR Camera Video Normal Operations
DYER USX T7N-R64W-S34 L01_0230_DUMP	.mp4	8/17/2015	IR Camera Video During Dump Event
DYER USX T7N-R64W-S34 L01_0231_POST	.mp4	8/17/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
DYER USX T7N-R64W-S34 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **DYER USX T7N-R64W-S34 L01**

**Consent Decree Tank System Number:** **597**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>	<b>65</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>	<b>65</b>	<b>400</b>	<b>400</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>				

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>30,646</b>	<b>30,866</b>	<b>1%</b>
Calculated Burner Capacity (scfh)	<b>5,351</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>42,087</b>	<b>42,087</b>	
Total VCS Capacity (scfh)	<b>47,438</b>	<b>53,754</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,792</b>	<b>22,888</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/10/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DYER USX T7N-R64W-S34 L01**

Consent Decree Tank System Number: **597**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69	0.69						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.81	0.81						
Gas/Oil Ratio (scf/bbl)	104.5	104.5						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	535	535						
Vapor Pressure (psia) <sup>c</sup>	78	78						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2312	2312						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	241.5	241.5						
Working Flow (Mscfd) <sup>h,i</sup>	22	22						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78	0.78				
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20	7.20				
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200				
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bwpd) <sup>f,g</sup>	1685	1685	3906	3906				

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	7	7	16	16				
Working Flow (Mscfd) <sup>l</sup>	9	9	22	22				

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	34	11

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	20,125	20,125
Oil Tank Working Rate	1,832	1,828
Water Tank Flash Rate	1,864	1,774
Water Tank Working Rate	2,616	2,490
Tank Breathing Rate	1,902	1,902
Truck Loading Vapor	2,527	2,527
Total	30,866	30,646



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **DYER USX T7N-R64W-S34 L01**

Consent Decree Tank System Number: **597**

**Audit Notes**

It is unknown whether the Modeling Guidance was correctly applied with unconfirmed water valve body sizes. The initial Field Data indicates all water valve bodies are 2". The Evaluation was completed with 1" valve bodies with 1/2" trims. Modification to the trim size was verified per the Job Sheet.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ECKAS MILLAGE T4N-R64W-S15 L01**

Consent Decree Tank System Number: **640**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ECKAS MILLAGE T4N-R64W-S15 L01_FINAL PACKET	.pdf	5/4/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ECKAS MILLAGE T4N-R64W-S15 L01_STEM Engineering Evaluation_rev1	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
ECKAS MILLAGE T4N-R64W-S15 L01_SIGNED EVAL	.pdf	6/29/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ECKAS MILLAGE T4N-R64W-S15 L01_FINAL PACKET	.pdf	5/20/2016	Work Request
ECKAS MILLAGE T4N-R64W-S15 L01_FINAL PACKET	.pdf	10/14/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ECKAS MILLAGE T4N-R64W-S15 L01_WALKDOWN	.pdf	3/30/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ECKAS MILLAGE T4N-R64W-S15 L01_IR VERIFICATION	.pdf	3/30/2017	IR Verification Field Data Sheet
ECKAS MILLAGE T4N-R64W-S15 L01_1915_NORMAL	.mp4	3/30/2017	IR Camera Video Normal Operations
ECKAS MILLAGE T4N-R64W-S15 L01_1916_DUMP	.mp4	3/30/2017	IR Camera Video During Dump Event
ECKAS MILLAGE T4N-R64W-S15 L01_1917_POST	.mp4	3/30/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ECKAS MILLAGE T4N-R64W-S15 L01_SIGNED EVAL	.pdf	6/29/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ECKAS MILLAGE T4N-R64W-S15 L01**

**Consent Decree Tank System Number:** **640**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>120</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>10,346</b>	<b>10,787</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>23,345</b>	<b>23,345</b>	
Total VCS Capacity (scfh)	<b>26,897</b>	<b>27,945</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,551</b>	<b>17,158</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/10/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ECKAS MILLAGE T4N-R64W-S15 L01**

Consent Decree Tank System Number: **640**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.34</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.46</b>							
Gas/Oil Ratio (scf/bbl)	<b>209.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>584</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>133</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1128</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>236.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>11</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>9,864</b>	<b>9,444</b>
Oil Tank Working Rate	<b>447</b>	<b>427</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>10,787</b>	<b>10,346</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ECKAS MILLAGE T4N-R64W-S15 L01**

Consent Decree Tank System Number: **640**

**Audit Notes**

The walkdown checklist (ECKAS MILLAGE T4N-R64W-S15 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other supplied documentation in the final packet (ECKAS MILLAGE T4N-R64W-S15 L01\_FINAL PACKET).

The Removed equipment document (ECKAS MILLAGE T4N-R64W-S15 L01\_FINAL PACKET, p 20) confirms that both separators were removed from the site and a new Leed 300 was installed. A1 from the walkdown checklist (ECKAS MILLAGE T4N-R64W-S15 L01\_WALKDOWN), p 2) confirms the signed evaluation (ECKAS MILLAGE T4N-R64W-S15 L01\_SIGNED EVAL) has the correct trim size listed. A 2" valve was used in the model to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The separator pneumatic PSHH is set by the operator not automation and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 120 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

This site was selected to be an alternate for IR camera inspection because the original video pans over the VCS from the KO to the burner too quickly to visually inspect for leaks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRLCH ST T5N-R65W-S36 L01**

Consent Decree Tank System Number: **233**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
EHRLCH ST T5N-R65W-S36 L01_FINAL PACKET	.pdf	1/27/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
EHRLCH ST T5N-R65W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	2/15/2017	STEM Engineering Evaluation Spreadsheet
EHRLCH ST T5N-R65W-S36 L01_SIGNED EVAL	.pdf	2/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
EHRLCH ST T5N-R65W-S36 L01_FINAL PACKET	.pdf	1/27/2017	Work Request
EHRLCH ST T5N-R65W-S36 L01_FINAL PACKET	.pdf	1/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
EHRLCH ST T5N-R65W-S36 L01_WALKDOWN	.pdf	1/27/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
EHRLCH ST T5N-R65W-S36 L01_IR VERIFICATION	.pdf	1/26/2017	IR Verification Field Data Sheet
EHRLCH ST T5N-R65W-S36 L01_0072_NORMAL	.mp4	1/25/2017	IR Camera Video Normal Operations
EHRLCH ST T5N-R65W-S36 L01_0073_DUMP	.mp4	1/25/2017	IR Camera Video During Dump Event
EHRLCH ST T5N-R65W-S36 L01_0074_POST	.mp4	1/25/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
EHRLCH ST T5N-R65W-S36 L01_SIGNED EVAL	.pdf	2/16/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **EHR LCH ST T5N-R65W-S36 L01**

**Consent Decree Tank System Number:** **233**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,602</b>	<b>7,746</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>5,427</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>15,654</b>	<b>15,654</b>	
Total VCS Capacity (scfh)	<b>21,081</b>	<b>27,321</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,479</b>	<b>19,575</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHR LCH ST T5N-R65W-S36 L01**

Consent Decree Tank System Number: **233**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.72	0.72						
Gas/Oil Ratio (scf/bbl)	96.4	96.4						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	7.20						
Critical Pressure (psia) <sup>b</sup>	530	530						
Vapor Pressure (psia) <sup>c</sup>	73	73						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	727	759						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1	73.2						
Working Flow (Mscfd) <sup>h,i</sup>	7	7						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	29	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	5,968	5,838
Oil Tank Working Rate	589	575
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
<b>Total</b>	<b>7,746</b>	<b>7,602</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** EHR LCH ST T5N-R65W-S36 L01

**Consent Decree Tank System Number:** 233

**Audit Notes**

The walkdown checklist (EHR LCH ST T5N-R65W-S36 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (EHR LCH ST T5N-R65W-S36 L01\_FINAL PACKET).

The STEM work request (EHR LCH ST T5N-R65W-S36 L01\_FINAL PACKET, p 3) requests the existing 212 dump valves be replaced with 1" 1400 with 1/2" trim on HLP sep #5. The Walkdown Checklist (EHR LCH ST T5N-R65W-S36 L01\_WALKDOWN) A1 confirms the trim was updated to 1/2". The Job sheet (EHR LCH ST T5N-R65W-S36 L01\_FINAL PACKET, p 21) does not mention that the valve size in the HLP was updated to 1" from 2". The model was run with a 2" valve size to be conservative.

This site was selected for IR camera inspection because the video was taken on a cloudy day and the video was taken with the tops of the tanks in front of the clouds, making it difficult to look for leaks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich CONNELL T4N-R64W-S4 L01**

Consent Decree Tank System Number: **620**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
EHRlich CONNELL T4N-R64W-S4 L01_FINAL PACKET	.pdf	5/4/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
EHRlich CONNELL T4N-R64W-S4 L01_STEM Engineering Evaluation_rev1	.xlsm	8/1/2016	STEM Engineering Evaluation Spreadsheet
EHRlich CONNELL T4N-R64W-S4 L01_SIGNED EVAL	.pdf	8/4/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
EHRlich CONNELL T4N-R64W-S4 L01_FINAL PACKET	.pdf	5/4/2018	Work Request
EHRlich CONNELL T4N-R64W-S4 L01_FINAL PACKET	.pdf	5/4/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
EHRlich CONNELL T4N-R64W-S4 L01_WALKDOWN	.pdf	5/4/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
EHRlich CONNELL T4N-R64W-S4 L01_IR VERIFICATION	.pdf	7/22/2018	IR Verification Field Data Sheet
EHRlich CONNELL T4N-R64W-S4 L01_1315_NORMAL	.mp4	7/21/2018	IR Camera Video Normal Operations
EHRlich CONNELL T4N-R64W-S4 L01_1316_DUMP	.mp4	7/21/2018	IR Camera Video During Dump Event
EHRlich CONNELL T4N-R64W-S4 L01_1317_POST	.mp4	7/21/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
EHRlich CONNELL T4N-R64W-S4 L01_SIGNED EVAL	.pdf	8/4/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **EHRlich CONNELL T4N-R64W-S4 L01**

**Consent Decree Tank System Number:** **620**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,098</b>	<b>2,098</b>	
Total VCS Capacity (scfh)	<b>5,025</b>	<b>7,931</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,720</b>	<b>4,625</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:	Davis Neeper
Audit Document Review Date:	7/10/2018
Audit Document Review Verified by:	Angela M. Oberlander
Audit Document Verification Date:	8/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich CONNELL T4N-R64W-S4 L01**

Consent Decree Tank System Number: **620**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	694							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	61.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

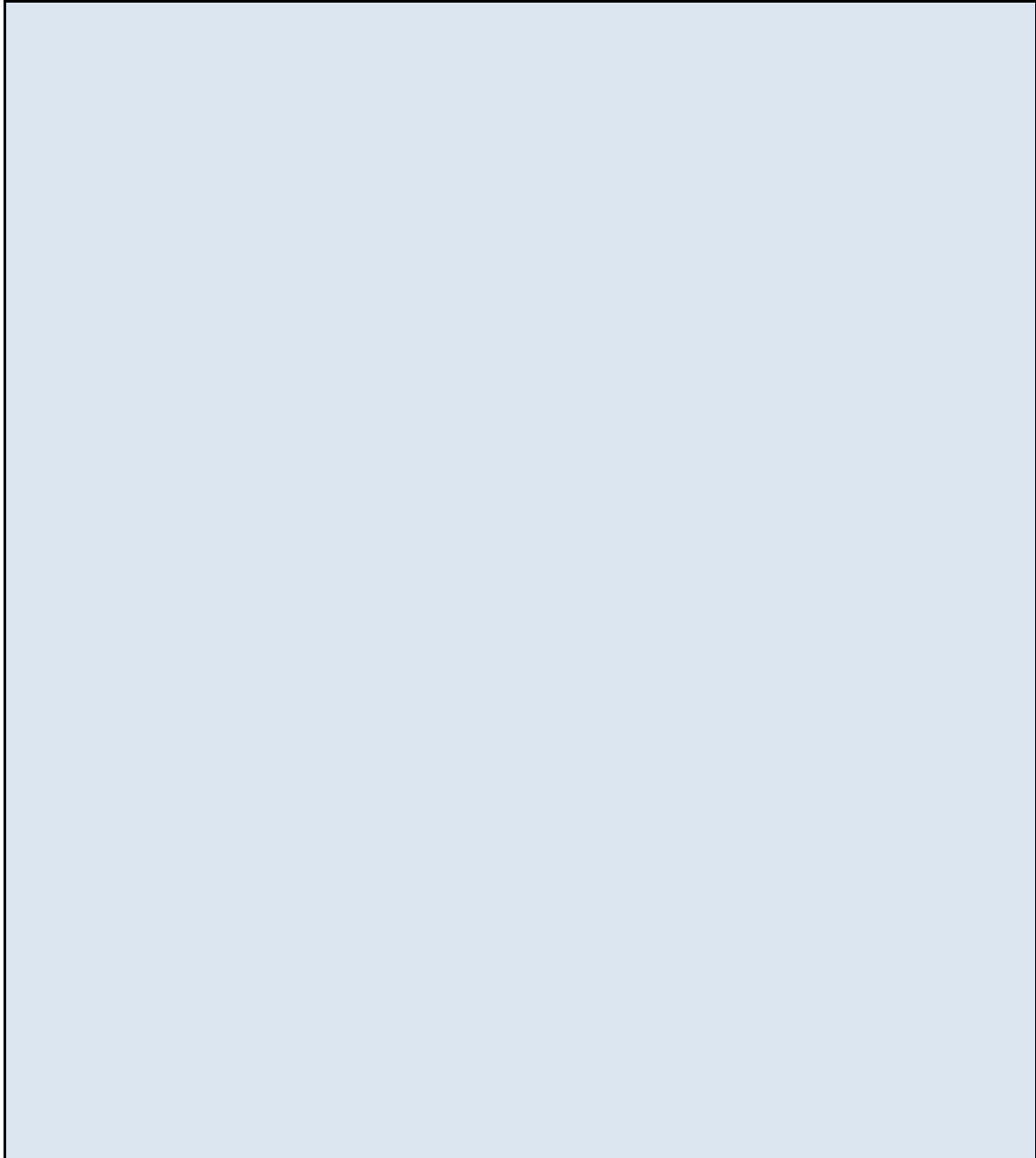
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,556	2,556
Oil Tank Working Rate	275	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich CONNELL T4N-R64W-S4 L01**

Consent Decree Tank System Number: **620**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich GREENHEAD T4N-R66W-S18 L01**

Consent Decree Tank System Number: **2166**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
EHRlich GREENHEAD T4N-R66W-S18 L01_FINAL PACKET	.pdf	12/6/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich GREENHEAD T4N-R66W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	12/2/2016	STEM Engineering Evaluation Spreadsheet
EHRlich GREENHEAD T4N-R66W-S18 L01_SIGNED EVAL	.pdf	12/12/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich GREENHEAD T4N-R66W-S18 L01_FINAL PACKET	.pdf	12/6/2017	Work Request
EHRlich GREENHEAD T4N-R66W-S18 L01_FINAL PACKET	.pdf	12/6/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich GREENHEAD T4N-R66W-S18 L01_FINAL PACKET	.pdf	12/6/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich GREENHEAD T4N-R66W-S18 L01_IR VERIFICATION	.pdf	11/8/2016	IR Verification Field Data Sheet
EHRlich GREENHEAD T4N-R66W-S18 L01_357_NORMAL	.mp4	11/7/2016	IR Camera Video Normal Operations
EHRlich GREENHEAD T4N-R66W-S18 L01_358_DUMP	.mp4	11/7/2016	IR Camera Video During Dump Event
EHRlich GREENHEAD T4N-R66W-S18 L01_359_POST	.mp4	11/7/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich GREENHEAD T4N-R66W-S18 L01_SIGNED EVAL	.pdf	12/12/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **EHRlich GREENHEAD T4N-R66W-S18 L01**

**Consent Decree Tank System Number:** **2166**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>539</b>	<b>539</b>	
Total VCS Capacity (scfh)	<b>4,566</b>	<b>5,497</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,122</b>	<b>2,053</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 12/18/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 4/13/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich GREENHEAD T4N-R66W-S18 L01**

Consent Decree Tank System Number: **2166**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	3,445	3,444



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich GREENHEAD T4N-R66W-S18 L01**

Consent Decree Tank System Number: **2166**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 22-29) are not dated. Assumed the date is the same as Facility Scouting date (7/8/2016).

**2. Facility walkdown checklist inconsistencies**

Item C6 and C8 of the Walkdown Checklist (Final Packet, pg 15) are marked "yes" (line drawn from top check box through all boxes below) which references multiple HP and LP oil dumps and the installation of corresponding check valves. The facility has a single HLP separator installed and these items are expected to be marked as "N/A".

Given these inconsistencies, the Walkdown Checklist has not been used as confirmation of changes on site.

**3. Oil dump valve trim size unknown - Request additional information from Noble**

The STEM Work Request (Final Packet, pg 3) requests the LP oil dump be confirmed at 1/2" trim. The only documentation which indicates the oil dump trim size is correct is item A1 on the STEM Walkdown Checklist (Final Packet, pg 11) is checked "yes", however, due to the inconsistencies noted above the checklist is not being used for verification purposes. No other information observed to verify dump valve trim size.

Additionally, no verification of the LP dump valve size was observed for the newly installed HLP separator. The engineering evaluation was run using a 1" valve while the standard LP gas header HLP design P&ID (Final Packet, pg 7) shows a 2" oil dump valve.

***Request additional data from Noble to confirm the oil dump valve and trim size onsite.***

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich T4N-R67W-S13 L01**

Consent Decree Tank System Number: **1715**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
EHRlich T4N-R67W-S13 L01_FINAL PACKET	.pdf	3/9/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich T4N-R67W-S13 L01_STEM Engineering Evaluation_rev1	.xlsm	9/18/2017	STEM Engineering Evaluation Spreadsheet
EHRlich T4N-R67W-S13 L01_SIGNED EVAL	.pdf	5/3/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich T4N-R67W-S13 L01_FINAL PACKET	.pdf	3/2/2017	Work Request
EHRlich T4N-R67W-S13 L01_FINAL PACKET	.pdf	4/3/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich T4N-R67W-S13 L01_WALKDOWN	.pdf	4/19/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich T4N-R67W-S13 L01_IR VERIFICATION	.pdf	4/19/2017	IR Verification Field Data Sheet
EHRlich T4N-R67W-S13 L01_1963_NORMAL	.mp4	4/19/2017	IR Camera Video Normal Operations
EHRlich T4N-R67W-S13 L01_1964_DUMP	.mp4	4/19/2017	IR Camera Video During Dump Event
EHRlich T4N-R67W-S13 L01_1965_POST	.mp4	4/19/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
EHRlich T4N-R67W-S13 L01_SIGNED EVAL	.pdf	5/3/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** EHRlich T4N-R67W-S13 L01

**Consent Decree Tank System Number:** 1715

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>361</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,027</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>959</b>	<b>2,639</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 3/22/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich T4N-R67W-S13 L01**

Consent Decree Tank System Number: **1715**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich T4N-R67W-S13 L01**

Consent Decree Tank System Number: **1715**

### Audit Notes

A new HLP separator was brought on-site to replace a HP separator. Could not verify the oil dump valve size (2" or 1") of the new HLP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich T6N-R64W-S34 L01**

Consent Decree Tank System Number: **1462**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
EHRlich T6N-R64W-S34 L01_FINAL PACKET	.pdf	5/7/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
EHRlich T6N-R64W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	4/22/2016	STEM Engineering Evaluation Spreadsheet
EHRlich T6N-R64W-S34 L01_SIGNED EVAL	.pdf	4/25/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
EHRlich T6N-R64W-S34 L01_FINAL PACKET	.pdf	5/7/2018	Work Request
EHRlich T6N-R64W-S34 L01_FINAL PACKET	.pdf	5/7/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
EHRlich T6N-R64W-S34 L01_WALKDOWN	.pdf	4/25/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
EHRlich T6N-R64W-S34 L01_IR VERIFICATION	.pdf	4/21/2016	IR Verification Field Data Sheet
EHRlich T6N-R64W-S34 L01_0872_Normal	.mp4	4/18/2016	IR Camera Video Normal Operations
EHRlich T6N-R64W-S34 L01_0873_Dump	.mp4	4/18/2016	IR Camera Video During Dump Event
EHRlich T6N-R64W-S34 L01_0874_Post	.mp4	4/18/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
EHRlich T6N-R64W-S34 L01_SIGNED EVAL	.pdf	4/25/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** EHRlich T6N-R64W-S34 L01

**Consent Decree Tank System Number:** 1462

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>477</b>	<b>477</b>	
Total VCS Capacity (scfh)	<b>4,245</b>	<b>5,077</b>	
VCS Capacity minus PPIVF (scfh)	<b>801</b>	<b>1,632</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/26/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/27/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich T6N-R64W-S34 L01**

Consent Decree Tank System Number: **1462**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

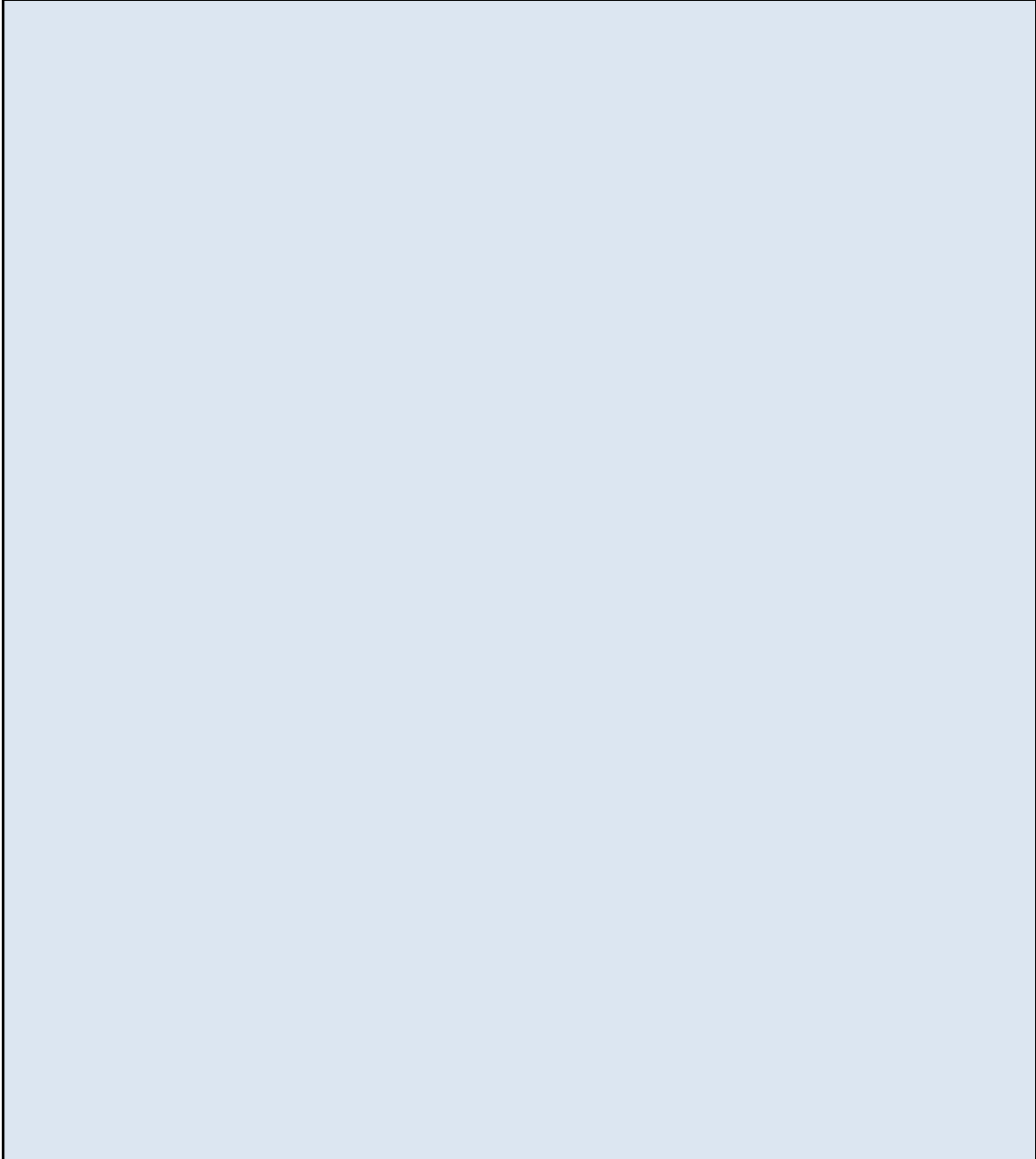


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EHRlich T6N-R64W-S34 L01**

Consent Decree Tank System Number: **1462**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EIFERT VANNOY T6N-R65W-S11 L01**

Consent Decree Tank System Number: **66**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
EIFERT VANNOY T6N-R65W-S11 L01_FINAL PACKET	.pdf	2/9/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
EIFERT VANNOY T6N-R65W-S11 L01_STEM Engineering Evaluation_rev1	.xlsm	1/11/2018	STEM Engineering Evaluation Spreadsheet
EIFERT VANNOY T6N-R65W-S11 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
EIFERT VANNOY T6N-R65W-S11 L01_FINAL PACKET	.pdf	2/9/2016	Work Request
EIFERT VANNOY T6N-R65W-S11 L01_FINAL PACKET	.pdf	2/9/2016	Construction Jobsheets
175 EIFERT VANNOY T6N-R65W-S11 L01_COMPLETED TLO	.pdf	11/14/2018	TLO Work Scope

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
EIFERT VANNOY T6N-R65W-S11 L01_WALKDOWN	.pdf	2/9/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
EIFERT VANNOY T6N-R65W-S11 L01_IR VERIFICATION	.pdf	2/5/2016	IR Verification Field Data Sheet
EIFERT VANNOY T6N-R65W-S11 L01_0659_NORMAL	.mp4	2/3/2016	IR Camera Video Normal Operations
EIFERT VANNOY T6N-R65W-S11 L01_0660_DUMP	.mp4	2/3/2016	IR Camera Video During Dump Event
EIFERT VANNOY T6N-R65W-S11 L01_0661_POST	.mp4	2/3/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
EIFERT VANNOY T6N-R65W-S11 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** EIFERT VANNOY T6N-R65W-S11 L01

**Consent Decree Tank System Number:** 66

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	9
Oil Tank Capacity (bbl):	300
# of Water Tanks:	2
Water Tank Capacity (bbl):	300
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3"
# VOC Lines KO to Burner:	2

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70	70						
Dump Valve Size & Trim Size (in)	2" & 1"	2" & 1"						

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	400	400	70	70				
Dump Valve Size & Trim Size (in)	2" & 1"	2" & 1"	2" & 1"	2" & 1"				

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	Cimarron 48 HV	TEC 4-CS (48" Tornado)		
Number of Units	1	1		
Man. Capacity (MSCFD)	109.272	110.4		

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	41,438	42,871	3%
Calculated Burner Capacity (scfh)	6,659	9,153	
Headspace Surge Capacity (scfh)	87,204	87,204	
Total VCS Capacity (scfh)	93,863	96,357	
VCS Capacity minus PPIVF (scfh)	52,425	53,486	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/19/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EIFERT VANNOY T6N-R65W-S11 L01**

Consent Decree Tank System Number: **66**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2409	2409						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7						
Working Flow (Mscfd) <sup>h,i</sup>	23	23						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77				
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25				
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200				
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bwpd) <sup>f,g</sup>	11381	11381	5068	5068				

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	46	46	20	20				
Working Flow (Mscfd) <sup>l</sup>	64	64	28	28				

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	51	11

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	22,641	22,641
Oil Tank Working Rate	1,909	1,904
Water Tank Flash Rate	5,483	5,482
Water Tank Working Rate	7,696	7,695
Tank Breathing Rate	2,615	1,189
Truck Loading Vapor	2,527	2,527
Total	42,871	41,438

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: EIFERT VANNOY T6N-R65W-S11 L01

Consent Decree Tank System Number: 66

**Audit Notes**

The Field Data Sheets in the Final Packet do not indicate the valve trim sizes for oil dump valve on 11-65HN HP separator, nor are the water dump valve trim sizes indicated for the 11-63HN HP, 11-65 HN HP, 11-65 HN LP separators. The walkdown checklist is marked NA for both points A1 and A2. No confirmation within the provided documentation that the valve trim sizes for these valves are correct.

NEI completed a field verification on or around 10/10/2018, 11-63 & 11-65 HP and LP separators were confirmed to have 2" valves with 1" trim for both oil and water.

The Engineering Evaluation did not include breathing losses from the non-production accepting tank bank. The facility configuration has two banks - one bank with four (4) oil tanks, one (1) water tank and one (1) TLO tank (separated via check valve), and another bank with three (3) oil tanks, one (1) water tank and one (1) TLO tank (separated via check valve). By excluding the breathing losses from the non-production accepting bank which continues to store oil, the correct application of the Modeling Guidelines cannot be verified.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EISENSTAT GILL LAND T6N-R64W-S22 L02**

Consent Decree Tank System Number: **1810**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
EISENSTAT GILL LAND T6N-R64W-S22 L02_FINAL PACKET	.pdf	11/11/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
EISENSTAT GILL LAND T6N-R64W-S22 L02_STEM Engineering Evaluation_rev1	.xlsm	6/2/2016	STEM Engineering Evaluation Spreadsheet
EISENSTAT GILL LAND T6N-R64W-S22 L02_SIGNED EVAL	.pdf	5/7/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
EISENSTAT GILL LAND T6N-R64W-S22 L02_FINAL PACKET	.pdf	11/11/2015	Work Request
EISENSTAT GILL LAND T6N-R64W-S22 L02_FINAL PACKET	.pdf	11/11/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
EISENSTAT GILL LAND T6N-R64W-S22 L02_WALKDOWN	.pdf	11/11/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
EISENSTAT GILL LAND T6N-R64W-S22 L02_IR VERIFICATION	.pdf	11/11/2015	IR Verification Field Data Sheet
EISENSTAT GILL LAND T6N-R64W-S22 L02_0435_NORMAL	.pdf	11/9/2015	IR Camera Video Normal Operations
EISENSTAT GILL LAND T6N-R64W-S22 L02_0436_DUMP	.mp4	11/9/2015	IR Camera Video During Dump Event
EISENSTAT GILL LAND T6N-R64W-S22 L02_0437_POST	.mp4	11/9/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
EISENSTAT GILL LAND T6N-R64W-S22 L02_SIGNED EVAL	.pdf	5/7/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **EISENSTAT GILL LAND T6N-R64W-S22 L02**

**Consent Decree Tank System Number:** **1810**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>185</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/16"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>4,050</b>	<b>4,050</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,016</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>5,016</b>	<b>6,542</b>	
VCS Capacity minus PPIVF (scfh)	<b>966</b>	<b>2,492</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/9/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EISENSTAT GILL LAND T6N-R64W-S22 L02**

Consent Decree Tank System Number: **1810**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.88</b>							
Gas/Oil Ratio (scf/bbl)	<b>376.7</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.59</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>1.51</b>							
Critical Pressure (psia) <sup>b</sup>	<b>642</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>198</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.80</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>232</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>87.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>2</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>317</b>	<b>0</b>
Mscfd	<b>8</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,641</b>	<b>3,641</b>
Oil Tank Working Rate	<b>92</b>	<b>92</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>317</b>	<b>317</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,050</b>	<b>4,050</b>

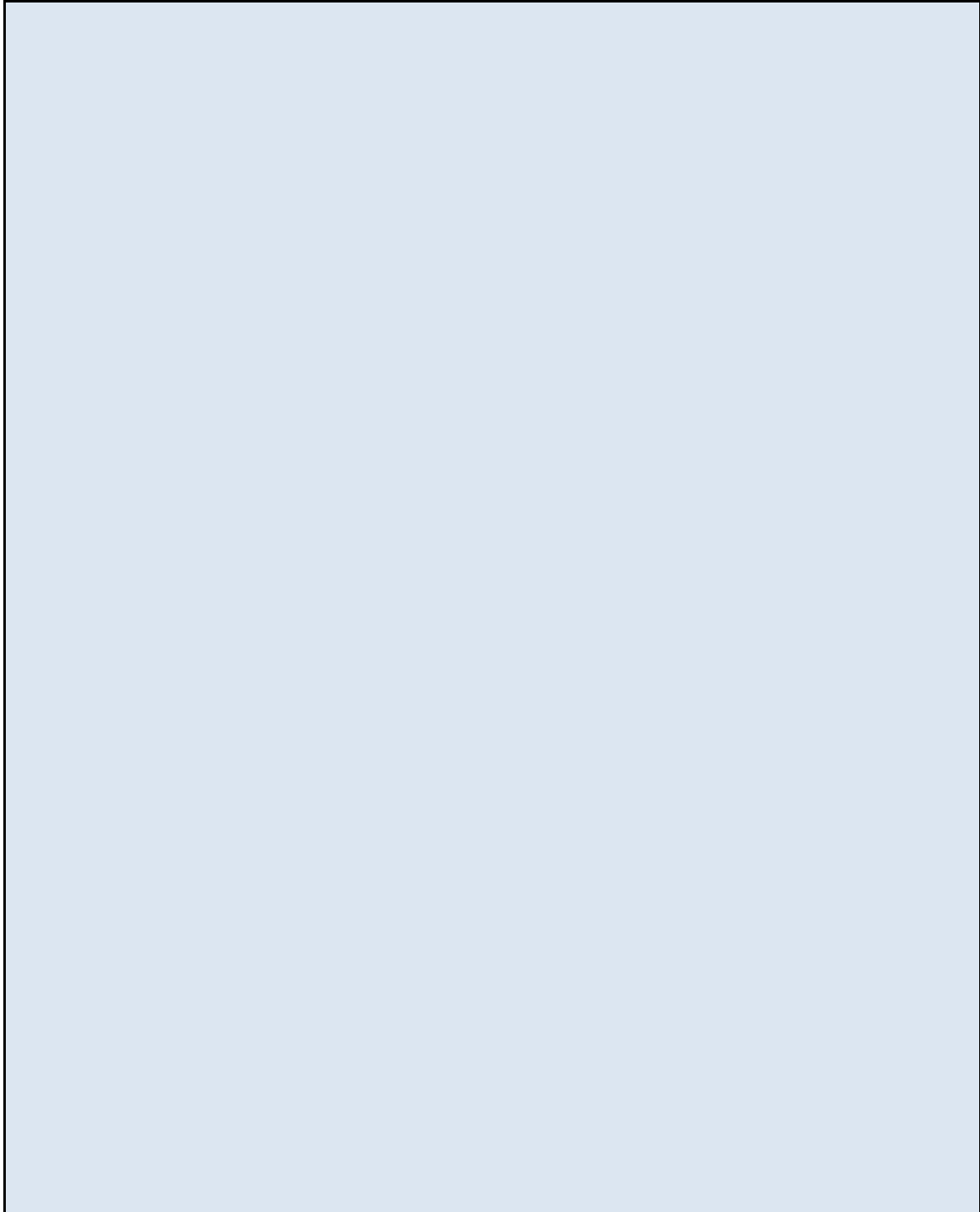


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EISENSTAT GILL LAND T6N-R64W-S22 L02**

Consent Decree Tank System Number: **1810**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EMC ST BERNHARDT T5N-R67W-S36 L01**

Consent Decree Tank System Number: **43**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
EMC ST BERNHARDT T5N-R67W-S36 L01_FINAL PACKET	.pdf	8/15/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
EMC ST BERNHARDT T5N-R67W-S36 L01_STEM Engineering Eval_rev1	.xls	10/12/2016	STEM Engineering Evaluation Spreadsheet
EMC ST BERNHARDT T5N-R67W-S36 L01_FINAL PACKET	.pdf	8/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
EMC ST BERNHARDT T5N-R67W-S36 L01_FINAL PACKET	.pdf	8/15/2016	Work Request
EMC ST BERNHARDT T5N-R67W-S36 L01_FINAL PACKET	.pdf	8/15/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
EMC ST BERNHARDT T5N-R67W-S36 L01_FINAL PACKET	.pdf	8/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
EMC ST BERNHARDT T5N-R67W-S36 L01_IR VERIFICATION	.pdf	8/9/2016	IR Verification Field Data Sheet
EMC ST BERNHARDT T5N-R67W-S36 L01_1377_NORMAL	.mp4	8/9/2016	IR Camera Video Normal Operations
EMC ST BERNHARDT T5N-R67W-S36 L01_1378_DUMP	.mp4	8/9/2016	IR Camera Video During Dump Event
EMC ST BERNHARDT T5N-R67W-S36 L01_1379_POST	.mp4	8/9/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
EMC ST BERNHARDT T5N-R67W-S36 L01_FINAL PACKET	.pdf	8/15/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EMC ST BERNHARDT T5N-R67W-S36 L01**

Consent Decree Tank System Number: **43**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,904</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>20,391</b>	<b>20,391</b>	
Total VCS Capacity (scfh)	<b>23,295</b>	<b>26,224</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,311</b>	<b>21,240</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 12/18/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 4/13/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EMC ST BERNHARDT T5N-R67W-S36 L01**

Consent Decree Tank System Number: **43**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **EMC ST BERNHARDT T5N-R67W-S36 L01**

Consent Decree Tank System Number: **43**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 21-27) are not dated. Assumed the date is the same as Facility Scouting date (1/6/2016).

**2. Facility walkdown checklist inconsistencies**

Item C13 of the Walkdown Checklist (Final Packet, pg 11) is checked "yes", indicating all tank fill lines are configured to enable the LP Separator to produce into all tanks. One oil tank onsite was converted to vapor headspace tank, see Job Sheet (Final Packet, pg 35), therefore it is not possible for the LP Separator to produce into all tanks onsite.

Item C8 of the Walkdown Checklist is checked "yes" in response to multiple LP oil dumps. Only a single LP separator is onsite and the item would be expected to be marked "N/A"

Given these inconsistencies, the Walkdown Checklist has not been used as confirmation of changes on site.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON ADOLPH T5N-R65W-S21 L01**

Consent Decree Tank System Number: **86**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ERICKSON ADOLPH T5N-R65W-S21 L01_FINAL PACKET	.pdf	1/3/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ERICKSON ADOLPH T5N-R65W-S21 L01_STEM Engineering Evaluation_rev1	.xls	1/16/2017	STEM Engineering Evaluation Spreadsheet
ERICKSON ADOLPH T5N-R65W-S21 L01_Final Signed STEM Plan	.pdf	1/30/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ERICKSON ADOLPH T5N-R65W-S21 L01_FINAL PACKET	.pdf	1/3/2017	Work Request
ERICKSON ADOLPH T5N-R65W-S21 L01_FINAL PACKET	.pdf	1/3/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ERICKSON ADOLPH T5N-R65W-S21 L01_WALKDOWN	.pdf	1/3/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ERICKSON ADOLPH T5N-R65W-S21 L01_IR VERIFICATION	.pdf	12/29/2016	IR Verification Field Data Sheet
ERICKSON ADOLPH T5N-R65W-S21 L01_1830_NORMAL	.mp4	12/28/2016	IR Camera Video Normal Operations
ERICKSON ADOLPH T5N-R65W-S21 L01_1831_DUMP	.mp4	12/28/2016	IR Camera Video During Dump Event
ERICKSON ADOLPH T5N-R65W-S21 L01_1832_POST	.mp4	12/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ERICKSON ADOLPH T5N-R65W-S21 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON ADOLPH T5N-R65W-S21 L01**

Consent Decree Tank System Number: **86**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,788</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>21,132</b>	<b>21,132</b>	
Total VCS Capacity (scfh)	<b>24,920</b>	<b>25,685</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,412</b>	<b>21,176</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 3/19/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON ADOLPH T5N-R65W-S21 L01**

Consent Decree Tank System Number: **86**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON ADOLPH T5N-R65W-S21 L01**

Consent Decree Tank System Number: **86**

**Audit Notes**

The final walkdown checklist has not been marked as completed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON T6N-R64W-S4 LO1**

Consent Decree Tank System Number: **1005**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S4 LO1_FINAL PACKET	.pdf	11/30/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S4 LO1_STEM Engineering Evaluation_rev1	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
ERICKSON T6N-R64W-S4 LO1_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S4 LO1_FINAL PACKET	.pdf	11/30/2015	Work Request
ERICKSON T6N-R64W-S4 LO1_FINAL PACKET	.pdf	11/30/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S4 LO1_WALKDOWN	.pdf	11/30/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S4 LO1_IR VERIFICATION	.pdf	11/30/2015	IR Verification Field Data Sheet
ERICKSON T6N-R64-S4-LO1 0465-NORMAL	.mp4	11/24/2015	IR Camera Video Normal Operations
ERICKSON T6N-R64-S4-LO1 0466-DUMP	.mp4	11/24/2015	IR Camera Video During Dump Event
ERICKSON T6N-R64-S4-LO1 0467-POST	.mp4	11/24/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S4 LO1_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ERICKSON T6N-R64W-S4 LO1**

**Consent Decree Tank System Number:** **1005**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>1 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>1 "</b>
# VOC Lines KO to Burner:	<b>4</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,271</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,467</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>703</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>5,170</b>	<b>6,542</b>	
VCS Capacity minus PPIVF (scfh)	<b>899</b>	<b>2,270</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 5/29/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/8/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON T6N-R64W-S4 LO1**

Consent Decree Tank System Number: **1005**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,271</b>	<b>4,271</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON T6N-R64W-S4 LO1**

Consent Decree Tank System Number: **1005**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON T6N-R64W-S8 L01**

Consent Decree Tank System Number: **607**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S8 L01_FINAL PACKET	.pdf	5/22/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	6/13/2017	STEM Engineering Evaluation Spreadsheet
ERICKSON T6N-R64W-S8 L01_SIGNED EVAL	.pdf	6/13/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S8 L01_FINAL PACKET	.pdf	5/22/2017	Work Request
ERICKSON T6N-R64W-S8 L01_FINAL PACKET	.pdf	5/22/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S8 L01_WALKDOWN	.pdf	5/12/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S8 L01_IR VERIFICATION	.pdf	5/12/2017	IR Verification Field Data Sheet
ERICKSON T6N-R64W-S8 L01_2056_NORMAL	.mp4	5/12/2017	IR Camera Video Normal Operations
ERICKSON T6N-R64W-S8 L01_2057_DUMP	.mp4	5/12/2017	IR Camera Video During Dump Event
ERICKSON T6N-R64W-S8 L01_2058_POST	.mp4	5/12/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ERICKSON T6N-R64W-S8 L01_SIGNED EVAL	.pdf	6/13/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ERICKSON T6N-R64W-S8 L01

**Consent Decree Tank System Number:** 607

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,543</b>	<b>3,544</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,971</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>10,015</b>	<b>10,015</b>	
Total VCS Capacity (scfh)	<b>13,986</b>	<b>14,973</b>	
VCS Capacity minus PPIVF (scfh)	<b>10,443</b>	<b>11,429</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:	Tom Kussard
Audit Document Review Date:	6/5/2018 & 11/26/2018
Audit Document Review Verified by:	K. Malmquist
Audit Document Verification Date:	12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON T6N-R64W-S8 L01**

Consent Decree Tank System Number: **607**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	694							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	61.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,556	2,556
Oil Tank Working Rate	275	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,544</b>	<b>3,543</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ERICKSON T6N-R64W-S8 L01**

Consent Decree Tank System Number: **607**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 11-16) are not dated. Date assumed to be same as Facility Scouting Date (9/9/2015).

**2. Diameter of Tanks to Knockout (KO) Pot VOC line - Request additional data**

The Engineering Evaluation shows (1) 3" VOC line from tanks to KO used in the Evaluation and the Field Datasheet (Final Packet, pg 12) shows a 2" VOC line from tanks to KO existed onsite previously.

No documentation is provided to indicate a 3" tank to KO VOC line size was installed onsite. If a 2" VOC line does still exist onsite and not a 3", then the control system capacity is being overestimated and the Engineering Design Standard is not being followed.

**Request confirmation of 3" tank to KO VOC line size onsite.**

**UPDATE 11-26-2018 - Noble confirmed via data request the Tanks to KO VOC line is 3" in diameter. The Engineering Design Standard is being followed**

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01**

**Consent Decree Tank System Number:** **704**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_FINAL PACKET	.pdf	4/8/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_STEM Engineering Evaluation_rev1	.xlsm	4/15/2016	STEM Engineering Evaluation Spreadsheet
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_SIGNED EVAL	.pdf	4/20/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_FINAL PACKET	.pdf	4/8/2016	Work Request
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_FINAL PACKET	.pdf	4/8/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_WALKDOWN	.pdf	4/8/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_IR VERIFICATION	.pdf	4/8/2016	IR Verification Field Data Sheet
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_0827_NORMAL	.mp4	4/5/2016	IR Camera Video Normal Operations
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_0828_DUMP	.mp4	4/5/2016	IR Camera Video During Dump Event
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_0829_POST	.mp4	4/5/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01_SIGNED EVAL	.pdf	4/20/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01**

**Consent Decree Tank System Number:** **704**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,017</b>	<b>9,018</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,575</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>23,498</b>	<b>23,498</b>	
Total VCS Capacity (scfh)	<b>26,073</b>	<b>29,331</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,056</b>	<b>20,313</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/10/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/2/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01**

Consent Decree Tank System Number: **704**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	23	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>9,018</b>	<b>9,017</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARAMIR FARMS SMITH AMEN HOFF SHELTON T3N-R64W-S6 L01**

Consent Decree Tank System Number: **704**

**Audit Notes**

The work request (PG 3 of Final Packet pdf) states to modify oil fill line on top of tanks to ensure LP separators can produce into the remaining 3 production tanks however nowhere in the job sheets (PG 21-24 of Final Packet pdf) does it confirm the production lines were reconfigured to fill the 3 remaining production tanks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARMERS FRICO T3N-R65W-S14 L01**

Consent Decree Tank System Number: **2217**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
FARMERS FRICO T3N-R65W-S14 L01_FINAL PACKET	.pdf	6/22/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
FARMERS FRICO T3N-R65W-S14 L01_STEM Engineering Evaluation_rev1	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
FARMERS FRICO T3N-R65W-S14 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
FARMERS FRICO T3N-R65W-S14 L01_FINAL PACKET	.pdf	6/22/2017	Work Request
FARMERS FRICO T3N-R65W-S14 L01_FINAL PACKET	.pdf	6/22/2017	Construction Jobsheets
FARMERS FRICO T3N-R65W-S14 L01_FINAL PACKET	.pdf	6/22/2017	Email From Automation

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
FARMERS FRICO T3N-R65W-S14 L01_WALKDOWN	.pdf	10/13/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
FARMERS FRICO T3N-R65W-S14 L01_IR VERIFICATION	.pdf	10/13/2016	IR Verification Field Data Sheet
FARMERS FRICO T3N-R65W-S14 L01_1593_NORMAL	.mp4	10/11/2016	IR Camera Video Normal Operations
FARMERS FRICO T3N-R65W-S14 L01_1594_DUMP	.mp4	10/11/2016	IR Camera Video During Dump Event
FARMERS FRICO T3N-R65W-S14 L01_1595_POST	.mp4	10/11/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
FARMERS FRICO T3N-R65W-S14 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARMERS FRICO T3N-R65W-S14 L01**

Consent Decree Tank System Number: **2217**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,751</b>	<b>15,753</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,904</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>69,871</b>	<b>69,871</b>	
Total VCS Capacity (scfh)	<b>72,775</b>	<b>75,704</b>	
VCS Capacity minus PPIVF (scfh)	<b>57,024</b>	<b>59,951</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:

Davis Neepser

Audit Document Review Date:

4/4/2018

Audit Document Review Verified by:

Angela M. Oberlander & James Van Horne

Audit Document Verification Date:

4/16/2018 & 8/25/2020

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARMERS FRICO T3N-R65W-S14 L01**

Consent Decree Tank System Number: **2217**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>15,753</b>	<b>15,751</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARMERS FRICO T3N-R65W-S14 L01**

Consent Decree Tank System Number: **2217**

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, indicates all tank fill lines are configured to enable LP separators to produce into all tanks.

Noble provided verbal confirmation that one oil tank was bottomed out on 8/25/2020.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARR T4N-R64W-S18 L01**

Consent Decree Tank System Number: **942**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FARR T4N-R64W-S18 L01_FINAL PACKET	.pdf	12/12/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FARR T4N-R64W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	12/12/2016	STEM Engineering Evaluation Spreadsheet
FARR T4N-R64W-S18 L01_SIGNED EVAL	.pdf	12/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FARR T4N-R64W-S18 L01_FINAL PACKET	.pdf	12/12/2016	Work Request
FARR T4N-R64W-S18 L01_FINAL PACKET	.pdf	12/12/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FARR T4N-R64W-S18 L01_WALKDOWN	.pdf	12/12/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FARR T4N-R64W-S18 L01_IR VERIFICATION	.pdf	12/12/2016	IR Verification Field Data Sheet
FARR T4N-R64W-S18 L01_1801_NORMAL	.mp4	12/7/2016	IR Camera Video Normal Operations
FARR T4N-R64W-S18 L01_1802_DUMP	.mp4	12/7/2016	IR Camera Video During Dump Event
FARR T4N-R64W-S18 L01_1803_POST	.mp4	12/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FARR T4N-R64W-S18 L01_SIGNED EVAL	.pdf	12/15/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FARR T4N-R64W-S18 L01**

**Consent Decree Tank System Number:** **942**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>456</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,483</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,039</b>	<b>1,514</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/26/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARR T4N-R64W-S18 L01**

Consent Decree Tank System Number: **942**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FARR T4N-R64W-S18 L01**

Consent Decree Tank System Number: **942**

**Audit Notes**

The walkdown checklist (FARR T4N-R64W-S18 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (FARR T4N-R64W-S18 L01\_FINAL PACKET).

The STEM work request (FARR T4N-R64W-S18 L01\_FINAL PACKET, p 12), p 3) requests the 2" VOC line from tanks to KO be upgraded from 2" to 3". The field data sheet (FARR T4N-R64W-S18 L01\_FINAL PACKET, p 12) indicates the VOC line from tanks to KO was 2" The job sheet does not mention upgrading the pipe diameter to 3", as it is in the signed evaluation (FARR T4N-R64W-S18 L01\_SIGNED EVAL, p 2). The data request response from Noble on 11/14/2018 confirms the VOC line was upgraded from 2" to 3".

This site was selected to be re-filmed because the shot looking at the thief hatch was shot looking in to a bright sky. It looked like the PRV was leaking in the DUMP video. Would like to re-film site to confirm.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** FAULKNER CECIL FARMS USX T7N-R64W-S30 L01

**Consent Decree Tank System Number:** 599

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_FINAL PACKET	.pdf	4/7/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	4/10/2017	STEM Engineering Evaluation Spreadsheet
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_SIGNED EVAL	.pdf	4/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_FINAL PACKET	.pdf	4/7/2017	Work Request
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_FINAL PACKET	.pdf	4/7/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_WALKDOWN	.pdf	4/7/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_1944_NORMAL	.mp4	4/6/2017	IR Camera Video Normal Operations
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_1945_DUMP	.mp4	4/6/2017	IR Camera Video During Dump Event
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_1946_POST	.mp4	4/6/2017	IR Camera Video Post Dump Event
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_IR VERIFICATION	.pdf	4/7/2017	IR Verification Field Data Sheet

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FAULKNER CECIL FARMS USX T7N-R64W-S30 L01_SIGNED EVAL	.pdf	4/12/2017	Signed Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** FAULKNER CECIL FARMS USX T7N-R64W-S30 L01

**Consent Decree Tank System Number:** 599

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	4
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,781	3,782	0%
Calculated Burner Capacity (scfh)	3,186	4,958	
Headspace Surge Capacity (scfh)	21,446	21,446	
Total VCS Capacity (scfh)	24,632	26,404	
VCS Capacity minus PPIVF (scfh)	20,851	22,622	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/7/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/8/2017



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FAULKNER CECIL FARMS USX T7N-R64W-S30 L01**

Consent Decree Tank System Number: **599**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,782</b>	<b>3,781</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FAULKNER CECIL FARMS USX T7N-R64W-S30 L01**

Consent Decree Tank System Number: **599**

**Audit Notes**

Bottomed out the two south most oil tanks and disconnected from liquid service. Tanks used for headspace only.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FAULKNER T7N-R64W-S30 L01**

Consent Decree Tank System Number: **1631**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
FAULKNER T7N-R64W-S30 L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
FAULKNER T7N-R64W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
FAULKNER T7N-R64W-S30 L01_SIGNED EVAL	.pdf	7/3/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
FAULKNER T7N-R64W-S30 L01_FINAL PACKET	.pdf	8/4/2017	Work Request
FAULKNER T7N-R64W-S30 L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
FAULKNER T7N-R64W-S30 L01_WALKDOWN	.pdf	7/26/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
FAULKNER T7N-R64W-S30 L01_IR VERIFICATION	.pdf	7/26/2017	IR Verification Field Data Sheet
FAULKNER T7N-R64W-S30 L01_2169_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
FAULKNER T7N-R64W-S30 L01_2171_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
FAULKNER T7N-R64W-S30 L01_2172_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
FAULKNER T7N-R64W-S30 L01_SIGNED EVAL	.pdf	7/3/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** FAULKNER T7N-R64W-S30 L01

**Consent Decree Tank System Number:** 1631

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	2" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,305	3,433	4%
Calculated Burner Capacity (scfh)	3,998	4,958	
Headspace Surge Capacity (scfh)	8,656	8,656	
Total VCS Capacity (scfh)	12,654	13,614	
VCS Capacity minus PPIVF (scfh)	9,349	10,182	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/19/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/18/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FAULKNER T7N-R64W-S30 L01**

Consent Decree Tank System Number: **1631**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,433</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FAULKNER T7N-R64W-S30 L01**

Consent Decree Tank System Number: **1631**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 22) indicates a new separator was installed onsite and ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 28) is checked "yes" indicating the oil dump trim is consistent with the Engineering Evaluation, and is therefore 1/2". There is no documentation indicating the oil dump valve size installed in the separator onsite.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the LP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FED T8N-R59W-S8 L01**

Consent Decree Tank System Number: **1939**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S8 L01_FINAL PACKET	.pdf	10/10/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm		STEM Engineering Evaluation Spreadsheet
FED T8N-R59W-S8 L01_SIGNED EVAL	.pdf	6/13/2017	Final Signed Engineering Evaluation
Cv_Cf of Treater Valve with Restriction Orifice	.pdf	2/14/2018	Derivation of orifice Cf and Cv

Modification Documents:

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S8 L01_FINAL PACKET	.pdf	4/11/2017	Work Request
FED T8N-R59W-S8 L01_FINAL PACKET	.pdf	4/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S8 L01_FINAL PACKET	.pdf	5/31/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S8 L01_FINAL PACKET	.pdf	5/31/2017	IR Verification Field Data Sheet
FED T8N-R59W-S8 L01_2092_NORMAL	.mp4	5/31/2017	IR Camera Video Normal Operations
FED T8N-R59W-S8 L01_2093_DUMP	.mp4	5/31/2017	IR Camera Video During Dump Event
FED T8N-R59W-S8 L01_2094_POST	.mp4	5/31/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S8 L01_SIGNED EVAL	.pdf	6/13/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FED T8N-R59W-S8 L01**

Consent Decree Tank System Number: **1939**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>145</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 1"*</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>35,441</b>	<b>35,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>77,342</b>	<b>77,342</b>	
Total VCS Capacity (scfh)	<b>80,269</b>	<b>83,175</b>	
VCS Capacity minus PPIVF (scfh)	<b>44,828</b>	<b>47,730</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 3/22/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FED T8N-R59W-S8 L01**

Consent Decree Tank System Number: **1939**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.53</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.65</b>							
Gas/Oil Ratio (scf/bbl)	<b>268.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.75</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>17.90</b>							
Critical Pressure (psia) <sup>b</sup>	<b>606</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>158</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3019</b>							

Crane Eqn 4-6: 0.97754 **15042.8 bopd**

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>810.6</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>29</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>33,773</b>	<b>33,773</b>
Oil Tank Working Rate	<b>1,196</b>	<b>1,193</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	35,445	35,441
-------	--------	--------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FED T8N-R59W-S8 L01**

Consent Decree Tank System Number: **1939**

**Audit Notes**

NEI Evaluation was completed with one of the two tanks out of service as additional headspace. The job sheet indicates the tank was disabled from receiving liquids while remaining connected to the VCS, but the walkdown checklist indicates all tanks are capable of receiving liquid production. Need verification whether tank is vapor service only or capable of receiving production liquids.

NEI response to follow data request regarding headspace tank provided below. Data received 8/14/2018: "Field verification for this facility was completed on or around 5/1/17, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header)."

Documentation indicates that a 1" flow orifice is used in combination with a valve to restrict flow from the LP separator. NEI provided a summary of their derivation of combined flow valve-orifice flow characteristics. SLR used Cf and Cv as provided by NEI.

Engineering Evaluation (FED T8N-R59W-S8 L01\_SIGNED EVAL) run at 145 psi upstream of the oil dump. The Field Datasheet (FED T8N-R59W-S8 L01\_FINAL PACKET, p 13) indicates that there is a PSV on the LP separator set at 75 psi, which limits dump valve pressure. SLR completed its audit calculations at 145 to match the Engineering Evaluation since this is more conservative.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FED T8N-R59W-S13 L01**

Consent Decree Tank System Number: **1679**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S13 L01_FINAL PACKET	.pdf	4/15/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S13 L01_STEM Engineering Evaluation_rev1	.xlsm	7/26/2017	STEM Engineering Evaluation Spreadsheet
FED T8N-R59W-S13 L01_SIGNED EVAL	.pdf	8/1/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S13 L01_FINAL PACKET	.pdf	3/7/2017	Work Request
FED T8N-R59W-S13 L01_FINAL PACKET	.pdf	4/22/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S13 L01_WALKDOWN	.pdf	7/26/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S13 L01_IR VERIFICATION	.pdf	7/25/2017	IR Verification Field Data Sheet
FED T8N-R59W-S13 L01_2160_NORMAL	.mp4	7/24/2017	IR Camera Video Normal Operations
FED T8N-R59W-S13 L01_2161_DUMP	.mp4	7/24/2017	IR Camera Video During Dump Event
FED T8N-R59W-S13 L01_2162_POST	.mp4	7/24/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
FED T8N-R59W-S13 L01_SIGNED EVAL	.pdf	8/1/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FED T8N-R59W-S13 L01**

**Consent Decree Tank System Number:** **1679**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>40,362</b>	<b>40,367</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>87,620</b>	<b>87,620</b>	
Total VCS Capacity (scfh)	<b>91,618</b>	<b>92,578</b>	
VCS Capacity minus PPIVF (scfh)	<b>51,256</b>	<b>52,212</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver

Audit Document Review Date: 11/28/2018

Audit Document Review Verified by: James Van Horne

Audit Document Verification Date: 12/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FED T8N-R59W-S13 L01**

Consent Decree Tank System Number: **1679**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.50</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.61</b>							
Gas/Oil Ratio (scf/bbl)	<b>256.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>601</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>153</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3603</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>923.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>34</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>38,463</b>	<b>38,463</b>
Oil Tank Working Rate	<b>1,428</b>	<b>1,424</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>40,367</b>	<b>40,362</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FED T8N-R59W-S13 L01**

Consent Decree Tank System Number: **1679**

**Audit Notes**

The separator pneumatic PSHH is set by the operator, not automation, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 140 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT MARLEY T4N-R64W-S1 L01**

Consent Decree Tank System Number: **448**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FEIT MARLEY T4N-R64W-S1 L01_FINAL PACKET	.pdf	1/14/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FEIT MARLEY T4N-R64W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
FEIT MARLEY T4N-R64W-S1 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FEIT MARLEY T4N-R64W-S1 L01_FINAL PACKET	.pdf	1/19/2016	Work Request
FEIT MARLEY T4N-R64W-S1 L01_FINAL PACKET	.pdf	4/1/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FEIT MARLEY T4N-R64W-S1 L01_WALKDOWN	.pdf	6/16/2016	Final Facility Walkdown Checklist
162-163_FEIT MARLEY T4N-R64W-S1 L01_Facility Walkdown	.pdf	11/14/2018	Final Facility Walkdown Checklist Received in Data Request

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FEIT MARLEY T4N-R64W-S1 L01_IR VERIFICATION	.pdf	6/15/2016	IR Verification Field Data Sheet
FEIT MARLEY T4N-R64W-S1 L01_1126_NORMAL	.mp4	6/13/2016	IR Camera Video Normal Operations
FEIT MARLEY T4N-R64W-S1 L01_1127_DUMP	.mp4	6/13/2016	IR Camera Video During Dump Event
FEIT MARLEY T4N-R64W-S1 L01_1128_POST	.mp4	6/13/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FEIT MARLEY T4N-R64W-S1 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** FEIT MARLEY T4N-R64W-S1 L01

**Consent Decree Tank System Number:** 448

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,222</b>	<b>5,222</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,507</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>24,363</b>	<b>24,363</b>	
Total VCS Capacity (scfh)	<b>26,870</b>	<b>30,196</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,648</b>	<b>24,974</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 11/28/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT MARLEY T4N-R64W-S1 L01**

Consent Decree Tank System Number: **448**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	29	

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
Total	5,222	5,222

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT MARLEY T4N-R64W-S1 L01**

Consent Decree Tank System Number: **448**

**Audit Notes**

Field datasheets were missing in original data provided. Received field datasheets from data request on 11/14/2018.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT T6N-R65W-S23 L03**

Consent Decree Tank System Number: **1907**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L03_FINAL PACKET	.pdf	5/2/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L03_STEM Engineering Evaluation_rev1	.xlsm	5/2/2017	STEM Engineering Evaluation Spreadsheet
FEIT T6N-R65W-S23 L03_SIGNED EVAL	.pdf	5/2/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L03_FINAL PACKET	.pdf	5/2/2017	Work Request
FEIT T6N-R65W-S23 L03_FINAL PACKET	.pdf	5/2/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L03_WALKDOWN	.pdf	5/1/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L03_IR VERIFICATION	.pdf	5/1/2017	IR Verification Field Data Sheet
FEIT T6N-R65W-S23 L03_1996_NORMAL	.mp4	5/1/2017	IR Camera Video Normal Operations
FEIT T6N-R65W-S23 L03_1997_DUMP	.mp4	5/1/2017	IR Camera Video During Dump Event
FEIT T6N-R65W-S23 L03_1998_POST	.mp4	5/1/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L03_SIGNED EVAL	.pdf	5/2/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT T6N-R65W-S23 L03**

Consent Decree Tank System Number: **1907**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,543</b>	<b>3,544</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,945</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>11,720</b>	<b>11,720</b>	
Total VCS Capacity (scfh)	<b>14,665</b>	<b>17,553</b>	
VCS Capacity minus PPIVF (scfh)	<b>11,122</b>	<b>14,009</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/20/2018 & 11/26/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT T6N-R65W-S23 L03**

Consent Decree Tank System Number: **1907**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	694							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	61.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,556	2,556
Oil Tank Working Rate	275	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,544</b>	<b>3,543</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT T6N-R65W-S23 L03**

Consent Decree Tank System Number: **1907**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 11-16) are not dated. Date assumed to be same as Facility Scouting Date (8/03/2016).

**2. Vapor Surge Vessel**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did (did not) confirm a tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable separator to produce into all tanks. Additional information was not provided to clarify the inconsistent and conflicting information, thus it is unknown whether the Engineering Design Standard for properly applied.

**Request confirmation from Noble that one tank was bottomed out (isolated from liquid service and used as headspace only tank).**

**UPDATE 11/26/2018 - Noble confirmed via data request one oil tank was bottomed and converted to a vapor surge vessel on this site. The Engineering Design Standard has been properly applied.**

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT T6N-R65W-S23 L04**

Consent Decree Tank System Number: **1610**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L04_FINAL PACKET	.pdf	12/22/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L04_STEM Engineering Evaluation_rev1	.xlsm	11/13/2017	STEM Engineering Evaluation Spreadsheet
FEIT T6N-R65W-S23 L04_SIGNED EVAL	.pdf	12/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L04_FINAL PACKET	.pdf	12/22/2015	Work Request
FEIT T6N-R65W-S23 L04_FINAL PACKET	.pdf	12/22/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L04_FINAL PACKET	.pdf	12/22/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L04_IR VERIFICATION	.pdf	12/22/2015	IR Verification Field Data Sheet
FEIT T6N-R65W-S23 L04_0536_NORMAL	.mp4	12/21/2015	IR Camera Video Normal Operations
FEIT T6N-R65W-S23 L04_0537_DUMP	.mp4	12/21/2015	IR Camera Video During Dump Event
FEIT T6N-R65W-S23 L04_0538_POST	.mp4	12/21/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FEIT T6N-R65W-S23 L04_SIGNED EVAL	.pdf	12/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT T6N-R65W-S23 L04**

Consent Decree Tank System Number: **1610**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,587</b>	<b>3,587</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,702</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>670</b>	<b>670</b>	
Total VCS Capacity (scfh)	<b>4,372</b>	<b>5,270</b>	
VCS Capacity minus PPIVF (scfh)	<b>785</b>	<b>1,683</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/12/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 9/17/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT T6N-R65W-S23 L04**

Consent Decree Tank System Number: **1610**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

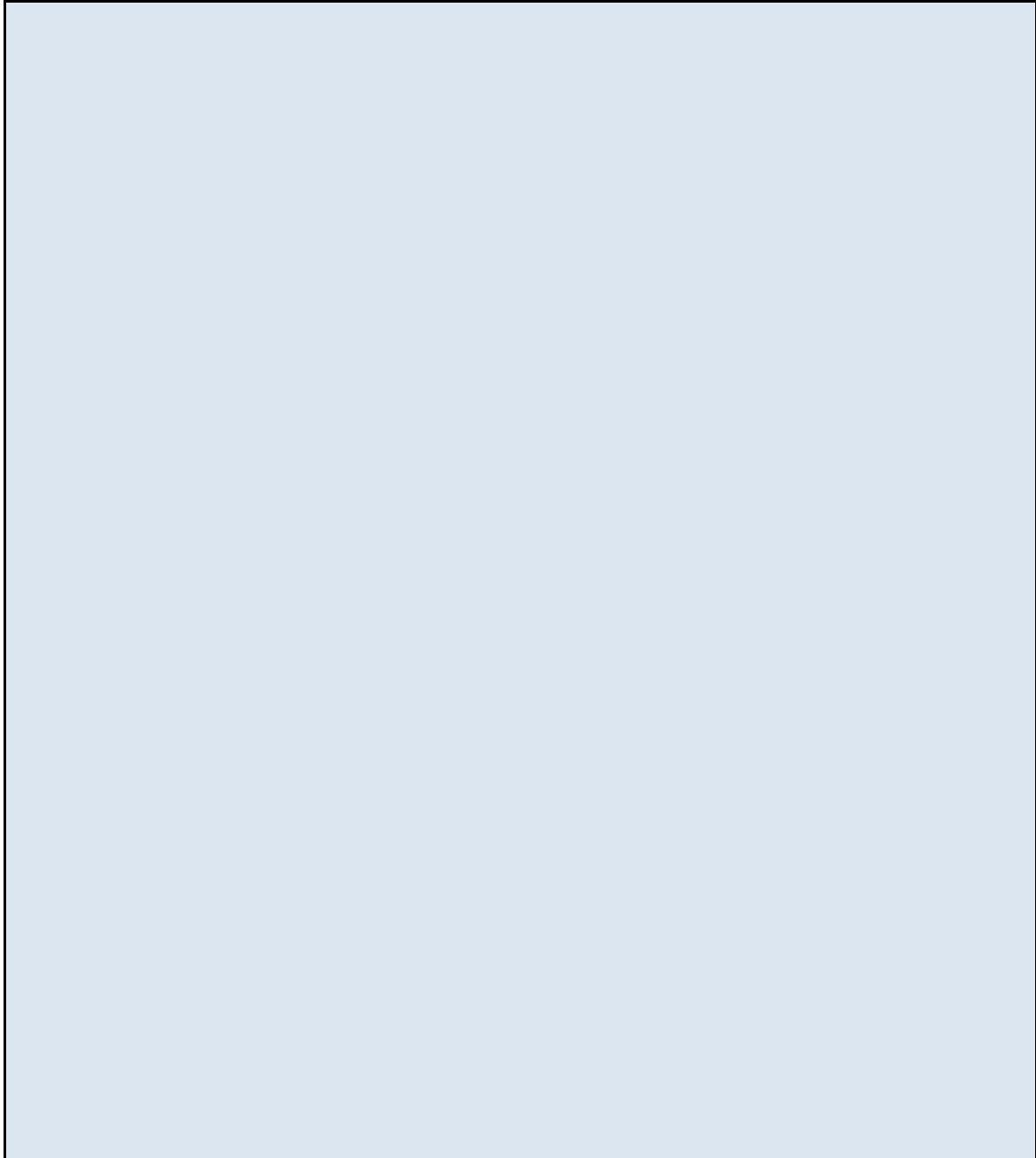
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>3,049</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,587</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FEIT T6N-R65W-S23 L04**

Consent Decree Tank System Number: **1610**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FERGUSON T5N-R64W-S23 L02**

Consent Decree Tank System Number: **303**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FERGUSON T5N-R64W-S23 L02_FINAL PACKET	.pdf	1/3/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FERGUSON T5N-R64W-S23 L02_STEM Engineering Evaluation_rev1	.xlsm	6/27/2017	STEM Engineering Evaluation Spreadsheet
FERGUSON T5N-R64W-S23 L02_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FERGUSON T5N-R64W-S23 L02_FINAL PACKET	.pdf	1/3/2018	Work Request
FERGUSON T5N-R64W-S23 L02_FINAL PACKET	.pdf	1/3/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FERGUSON T5N-R64W-S23 L02_WALKDOWN	.pdf	1/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FERGUSON T5N-R64W-S23 L02_IR VERIFICATION.	.pdf	1/8/2016	IR Verification Field Data Sheet
FERGUSON T5N-R64W-S23 L02_0091_NORMAL	.mp4	1/7/2016	IR Camera Video Normal Operations
FERGUSON T5N-R64W-S23 L02_0092_DUMP	.mp4	1/7/2016	IR Camera Video During Dump Event
FERGUSON T5N-R64W-S23 L02_0093_POST	.mp4	1/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FERGUSON T5N-R64W-S23 L02_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FERGUSON T5N-R64W-S23 L02**

Consent Decree Tank System Number: **303**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,244</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,228</b>	<b>2,228</b>	
Total VCS Capacity (scfh)	<b>5,780</b>	<b>6,828</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,698</b>	<b>2,584</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/21/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/26/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FERGUSON T5N-R64W-S23 L02**

Consent Decree Tank System Number: **303**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	794							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	82.9							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	11	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,454	3,307
Oil Tank Working Rate	314	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,244</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FERGUSON T5N-R64W-S23 L02**

Consent Decree Tank System Number: **303**

**Audit Notes**

The Walkdown checklist (FERGUSON T5N-R64W-S23 L02\_WALKDOWN) was not verified as being complete. Completion was verified through other documentation in the final packet (FERGUSON T5N-R64W-S23 L02\_FINAL PACKET).

The field datasheet (FERGUSON T5N-R64W-S23 L02\_FINAL PACKET) lists the HP separator as having a 2" valve and a 1" trim. The job sheet (FERGUSON T5N-R64W-S23 L02\_FINAL PACKET, p 19) confirms the trim was updated to 1/2", but there is no mention of reducing the valve size to 1". Therefore, the model was run with a 2" valve to be conservative. It is unknown in this case if the modeling guideline was strictly followed.

This site was selected for further IR Camera inspection because the camera is very shaky and the video was filmed looking into the clouds.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIOLOSKI KERBEL T5N-R65W-S26 L01**

Consent Decree Tank System Number: **2288**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FIOLOSKI KERBEL T5N-R65W-S26 L01_FINAL PACKET	.pdf	5/7/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FIOLOSKI KERBEL T5N-R65W-S26 L01_STEM Engineering Evaluation_rev 1	.xlsm	11/11/2016	STEM Engineering Evaluation Spreadsheet
FIOLOSKI KERBEL T5N-R65W-S26 L01_SIGNED EVAL	.pdf	11/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FIOLOSKI KERBEL T5N-R65W-S26 L01_FINAL PACKET	.pdf	5/7/2018	Work Request
FIOLOSKI KERBEL T5N-R65W-S26 L01_FINAL PACKET	.pdf	5/7/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FIOLOSKI KERBEL T5N-R65W-S26 L01_WALKDOWN	.pdf	11/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FIOLOSKI KERBEL T5N-R65W-S26 L01_IR VERIFICATION	.pdf	11/10/2016	IR Verification Field Data Sheet
FIOLOSKI KERBEL T5N-R65W-S26 L01_1690_NORMAL	.mp4	11/8/2016	IR Camera Video Normal Operations
FIOLOSKI KERBEL T5N-R65W-S26 L01_1691_DUMP	.mp4	11/8/2016	IR Camera Video During Dump Event
FIOLOSKI KERBEL T5N-R65W-S26 L01_1692_POST	.mp4	11/8/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FIOLOSKI KERBEL T5N-R65W-S26 L01_SIGNED EVAL	.pdf	11/15/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIOLOSKI KERBEL T5N-R65W-S26 L01**

Consent Decree Tank System Number: **2288**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>344</b>	<b>344</b>	
Total VCS Capacity (scfh)	<b>4,371</b>	<b>5,302</b>	
VCS Capacity minus PPIVF (scfh)	<b>927</b>	<b>1,858</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/2/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/5/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIOLOSKI KERBEL T5N-R65W-S26 L01**

Consent Decree Tank System Number: **2288**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

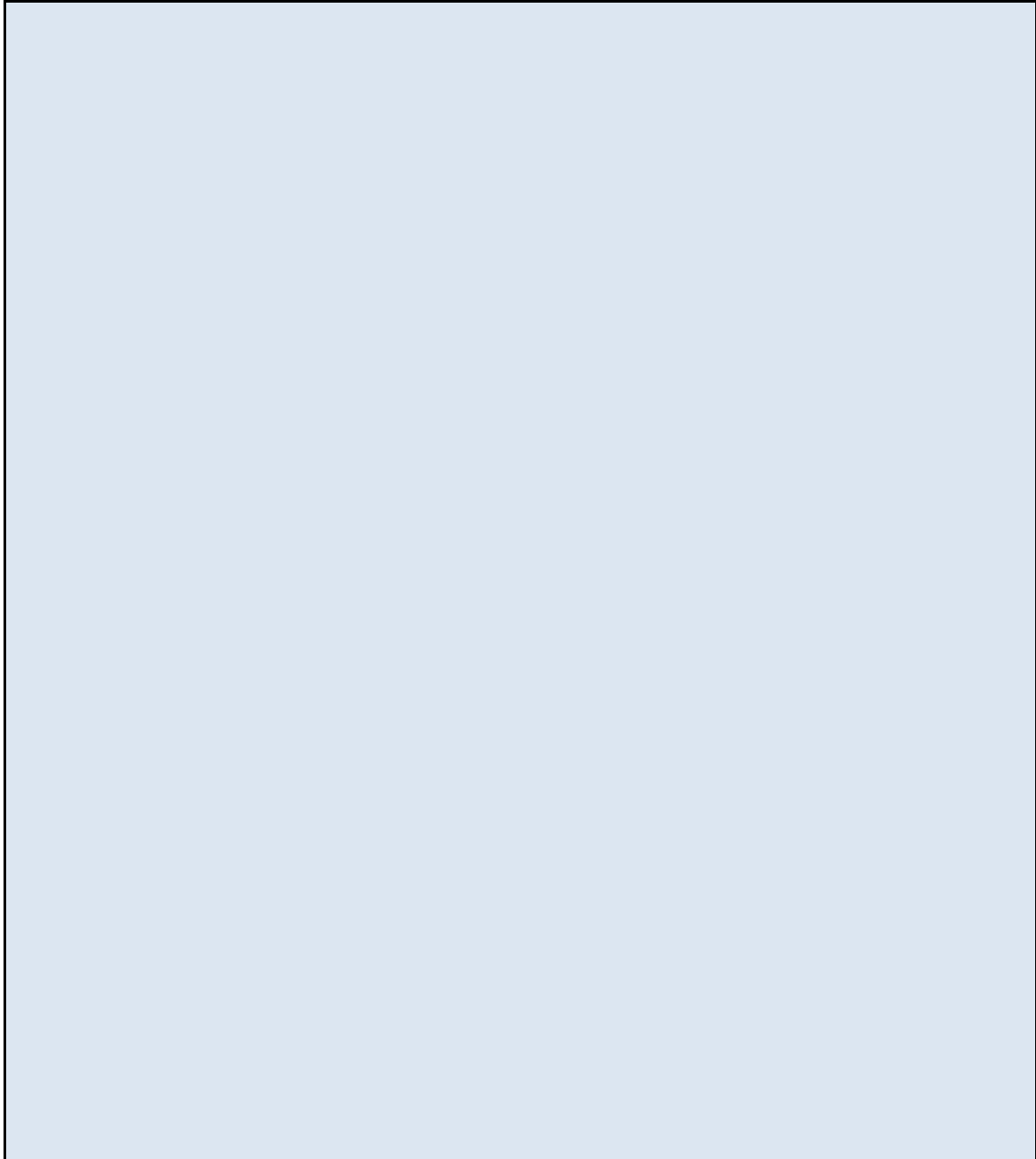
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIOLOSKI KERBEL T5N-R65W-S26 L01**

Consent Decree Tank System Number: **2288**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIRESTIEN T6N-R66W-S30 L02**

Consent Decree Tank System Number: **1735**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FIRESTIEN T6N-R66W-S30 L02_FINAL PACKET	.pdf	5/18/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FIRESTIEN T6N-R66W-S30 L02_STEM Engineering Evaluation_rev1	.xlsm	5/4/2018	STEM Engineering Evaluation Spreadsheet
FIRESTIEN T6N-R66W-S30 L02_SIGNED EVAL	.pdf	5/4/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FIRESTIEN T6N-R66W-S30 L02_FINAL PACKET	.pdf	5/18/2018	Work Request
FIRESTIEN T6N-R66W-S30 L02_FINAL PACKET	.pdf	5/18/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FIRESTIEN T6N-R66W-S30 L02_WALKDOWN	.pdf	10/10/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FIRESTIEN T6N-R66W-S30 L02_IR VERIFICATION	.pdf	10/6/2016	IR Verification Field Data Sheet
FIRESTIEN T6N-R66W-S30 L02_1581_NORMAL	.mp4	10/5/2016	IR Camera Video Normal Operations
FIRESTIEN T6N-R66W-S30 L02_1582_DUMP	.mp4	10/5/2016	IR Camera Video During Dump Event
FIRESTIEN T6N-R66W-S30 L02_1583_POST	.mp4	10/5/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FIRESTIEN T6N-R66W-S30 L02_SIGNED EVAL	.pdf	5/4/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIRESTIEN T6N-R66W-S30 L02**

Consent Decree Tank System Number: **1735**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>19,977</b>	<b>19,977</b>	
Total VCS Capacity (scfh)	<b>24,066</b>	<b>24,577</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,558</b>	<b>20,068</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/10/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/2/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIRESTIEN T6N-R66W-S30 L02**

Consent Decree Tank System Number: **1735**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

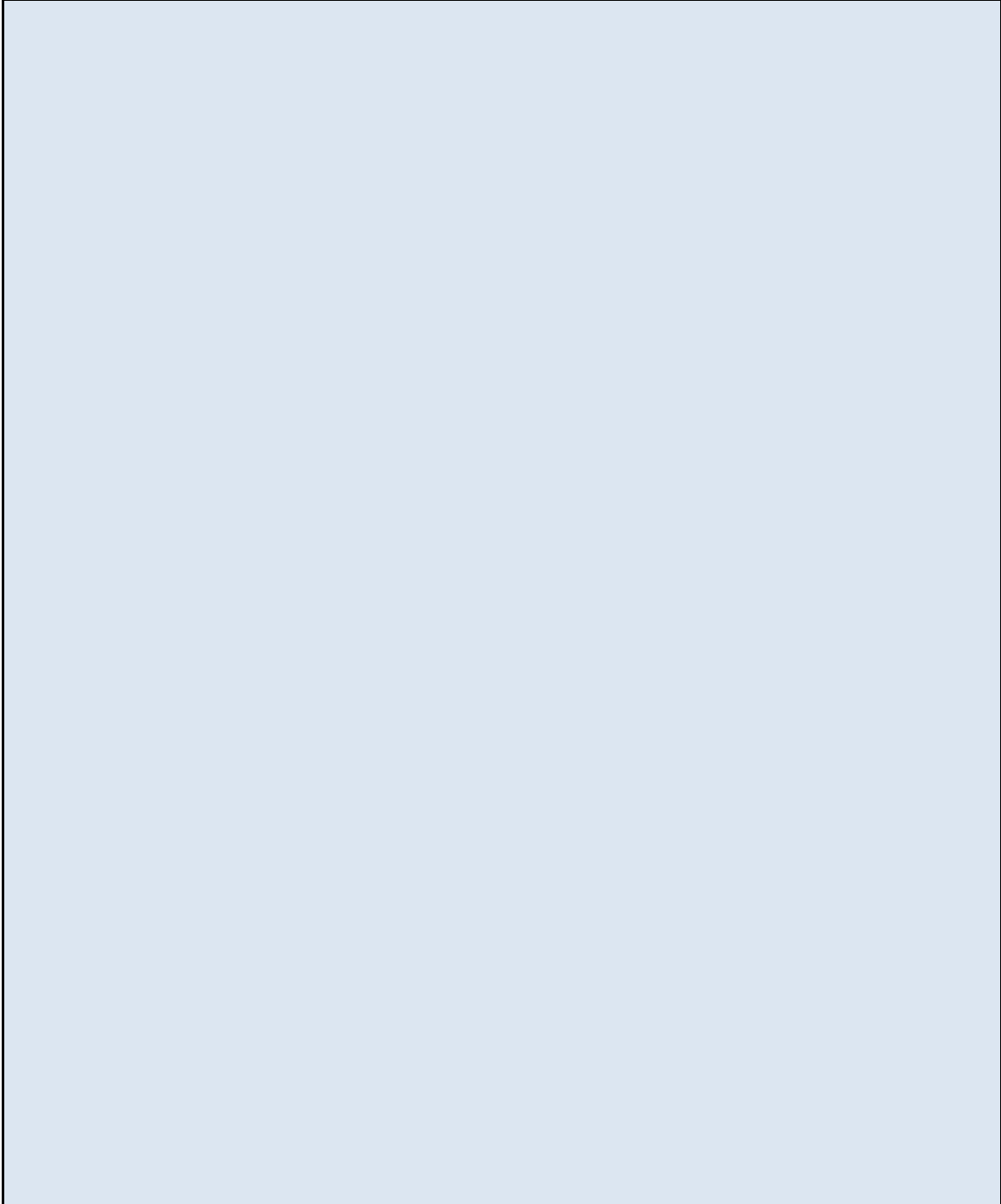
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIRESTIEN T6N-R66W-S30 L02**

Consent Decree Tank System Number: **1735**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01**

Consent Decree Tank System Number: **190**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_FINAL PACKET	PDF	NO DATE	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_SIGNED EVAL	PDF	7/6/2016	Final Signed Engineering Evaluation
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_STEM Engineering Evaluation_rev1	.xslm	7/5/2016	STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_FINAL PACKET	PDF	4/19/2016	Work Request
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_FINAL PACKET	PDF	6/8/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_FINAL PACKET	PDF	6/28/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_FINAL PACKET	PDF	6/28/2016	IR Verification Field Data Sheet
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_1218_NORMAL	MP4	6/28/2016	IR Camera Video Normal Operations
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_1219_DUMP	MP4	6/28/2016	IR Camera Video During Dump Event
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_1220_POST	MP4	6/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01_SIGNED EVAL	PDF	7/6/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01**

**Consent Decree Tank System Number:** **190**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,504</b>	<b>21,504</b>	
Total VCS Capacity (scfh)	<b>24,431</b>	<b>27,337</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,923</b>	<b>22,828</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Erin Ehrmantraut  
 Audit Document Review Date: 11/8/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/4/2017





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01**

Consent Decree Tank System Number: **190**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	4,509	4,508

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS MONFORT GILCRST T4N-R66W-S16 L01**

Consent Decree Tank System Number: **190**

**Audit Notes**

The STEM Work Request (Final Packet, pg 3) requests LP separator to shut-in at 70 psig. The Engineering Evaluation (Signed Eval) shows a 70 psig max separator pressure was used in the Evaluation. The Job Sheet (Final Packet, pg 23) states the LP separators were set to shut-in at 60 psig and the QC Stem Checkout form (Final Packet, pg 22) states it was set at 70 psig. A 70 psig LP separator shut-in pressure was used in SLR's evaluation.

The PRVs are not visible in the provided IR videos.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS T4N-R66W-S4 L01**

Consent Decree Tank System Number: **58**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FIVE RIVERS T4N-R66W-S4 L01_FINAL PACKET	.pdf	6/28/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS T4N-R66W-S4 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
FIVE RIVERS T4N-R66W-S4 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS T4N-R66W-S4 L01_FINAL PACKET	.pdf	6/28/2016	Work Request
FIVE RIVERS T4N-R66W-S4 L01_FINAL PACKET	.pdf	6/28/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS T4N-R66W-S4 L01_WALKDOWN	.pdf	6/24/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS T4N-R66W-S4 L01_IR VERIFICATION	.pdf	6/23/2016	IR Verification Field Data Sheet
FIVE RIVERS T4N-R66W-S4 L01_1176_NORMAL	.mp4	6/22/2016	IR Camera Video Normal Operations
FIVE RIVERS T4N-R66W-S4 L01_1177_DUMP	.mp4	6/22/2016	IR Camera Video During Dump Event
FIVE RIVERS T4N-R66W-S4 L01_1178_POST	.mp4	6/22/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS T4N-R66W-S4 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FIVE RIVERS T4N-R66W-S4 L01**

**Consent Decree Tank System Number:** **58**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,459</b>	<b>5,460</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,881</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>46,554</b>	<b>46,554</b>	
Total VCS Capacity (scfh)	<b>49,435</b>	<b>52,387</b>	
VCS Capacity minus PPIVF (scfh)	<b>43,976</b>	<b>46,927</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 12/13/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS T4N-R66W-S4 L01**

Consent Decree Tank System Number: **58**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>34</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>5,460</b>	<b>5,459</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** FIVE RIVERS T4N-R66W-S4 L01

**Consent Decree Tank System Number:** 58

**Audit Notes**

The walkdown checklist (FIVE RIVERS T4N-R66W-S4 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (FIVE RIVERS T4N-R66W-S4 L01\_FINAL PACKET).

This site was selected to be re-filmed with an IR camera because the pipes were quickly panned over and no joints were inspected.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS USX T4N-R66W-S9 L01**

Consent Decree Tank System Number: **189**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FIVE RIVERS USX T4N-R66W-S9 L01_FINAL PACKET	.pdf	9/18/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS USX T4N-R66W-S9 L01_STEM Engineering Evaluation_rev1	.xls	9/18/2017	STEM Engineering Evaluation Spreadsheet
FIVE RIVERS USX T4N-R66W-S9 L01_Final Signed STEM Plan	.pdf	1/17/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS USX T4N-R66W-S9 L01_FINAL PACKET	.pdf	9/18/2017	Work Request
FIVE RIVERS USX T4N-R66W-S9 L01_FINAL PACKET	.pdf	9/18/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS USX T4N-R66W-S9 L01_WALKDOWN	.pdf	5/13/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS USX T4N-R66W-S9 L01_IR VERIFICATION	.pdf	5/12/2016	IR Verification Field Data Sheet
FIVE RIVERS USX T4N-R66W-S9 L01_0963_NORMAL	.mp4	5/10/2016	IR Camera Video Normal Operations
FIVE RIVERS USX T4N-R66W-S9 L01_0964_DUMP	.mp4	5/10/2016	IR Camera Video During Dump Event
FIVE RIVERS USX T4N-R66W-S9 L01_0965_POST	.mp4	5/10/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FIVE RIVERS USX T4N-R66W-S9 L01_SIGNED EVAL	.pdf	9/26/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS USX T4N-R66W-S9 L01**

Consent Decree Tank System Number: **189**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,646</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>25,347</b>	<b>25,347</b>	
Total VCS Capacity (scfh)	<b>27,993</b>	<b>31,180</b>	
VCS Capacity minus PPIVF (scfh)	<b>23,009</b>	<b>26,196</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS

Audit Document Review Date: 3/20/2018

Audit Document Review Verified by: Jesse Hanshaw

Audit Document Verification Date: 5/21/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS USX T4N-R66W-S9 L01**

Consent Decree Tank System Number: **189**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C)	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	23	

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
Total	4,985	4,984

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FIVE RIVERS USX T4N-R66W-S9 L01**

Consent Decree Tank System Number: **189**

**Audit Notes**

The final walkdown checklist is not marked as being complete.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOEMEYER FOE T5N-R64W-S2 L01**

Consent Decree Tank System Number: **288**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FOEMEYER FOE T5N-R64W-S2 L01_FINAL PACKET	.pdf	10/21/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FOEMEYER FOE T5N-R64W-S2 L01_STEM Engineering Evaluation_rev1	.xls	12/1/2017	STEM Engineering Evaluation Spreadsheet
FOEMEYER FOE T5N-R64W-S2 L01_Final Signed STEM Plan	.pdf	1/17/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FOEMEYER FOE T5N-R64W-S2 L01_FINAL PACKET	.pdf	10/21/2015	Work Request
FOEMEYER FOE T5N-R64W-S2 L01_FINAL PACKET	.pdf	10/21/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FOEMEYER FOE T5N-R64W-S2 L01_WALKDOWN	.pdf	10/21/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FOEMEYER FOE T5N-R64W-S2 L01_IR VERIFICATION	.pdf	10/21/2015	IR Verification Field Data Sheet
FOEMEYER FOE T5N-R64W-S2 L01_0352_NORMAL	.mp4	10/19/2015	IR Camera Video Normal Operations
FOEMEYER FOE T5N-R64W-S2 L01_0353_DUMP	.mp4	10/19/2015	IR Camera Video During Dump Event
FOEMEYER FOE T5N-R64W-S2 L01_0354_POST	.mp4	10/19/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FOEMEYER FOE T5N-R64W-S2 L01_SIGNED EVAL	.pdf	12/8/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOEMEYER FOE T5N-R64W-S2 L01**

Consent Decree Tank System Number: **288**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>500</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>18,625</b>	<b>18,626</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,957</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>27,525</b>	<b>27,525</b>	
Total VCS Capacity (scfh)	<b>31,482</b>	<b>32,125</b>	
VCS Capacity minus PPIVF (scfh)	<b>12,857</b>	<b>13,499</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 3/21/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/21/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOEMEYER FOE T5N-R64W-S2 L01**

Consent Decree Tank System Number: **288**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.80</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>162.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>12689</b>	<b>5068</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>51</b>	<b>20</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>71</b>	<b>28</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>34</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,753</b>	<b>6,753</b>
Oil Tank Working Rate	<b>569</b>	<b>568</b>
Water Tank Flash Rate	<b>2,959</b>	<b>2,959</b>
Water Tank Working Rate	<b>4,154</b>	<b>4,154</b>
Tank Breathing Rate	<b>1,664</b>	<b>1,664</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>18,626</b>	<b>18,625</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOEMEYER FOE T5N-R64W-S2 L01**

Consent Decree Tank System Number: **288**

### Audit Notes

Walkdown not marked complete

There is a discrepancy in regards to the water dump valve trim size on the LP. The field sheets (PG 13 of PDF) show the valve trim size to have been 1/2" however the stem design confirmation form (PG 5 of PDF) shows the valve trim size to be 1". The work request nor the job sheets confirm this work was completed, going from 1/2" trim to 1" trim on the LP water dump, however this is how the site was modeled.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOLEY SMITH CURD T4N-R63W-S5 L01**

Consent Decree Tank System Number: **451**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FOLEY SMITH CURD T4N-R63W-S5 L01_FINAL PACKET	.pdf	3/29/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FOLEY SMITH CURD T4N-R63W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
FOLEY SMITH CURD T4N-R63W-S5 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FOLEY SMITH CURD T4N-R63W-S5 L01_FINAL PACKET	.pdf	3/29/2017	Work Request
FOLEY SMITH CURD T4N-R63W-S5 L01_FINAL PACKET	.pdf	3/29/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FOLEY SMITH CURD T4N-R63W-S5 L01_WALKDOWN	.pdf	10/20/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FOLEY SMITH CURD T4N-R63W-S5 L01_IR VERIFICATION	.pdf	10/19/2015	IR Verification Field Data Sheet
FOLEY SMITH CURD T4N-R63W-S5 L01_0335_NORMAL	.mp4	10/12/2015	IR Camera Video Normal Operations
FOLEY SMITH CURD T4N-R63W-S5 L01_0336_DUMP	.mp4	10/12/2015	IR Camera Video During Dump Event
FOLEY SMITH CURD T4N-R63W-S5 L01_0337_POST	.mp4	10/12/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FOLEY SMITH CURD T4N-R63W-S5 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FOLEY SMITH CURD T4N-R63W-S5 L01**

**Consent Decree Tank System Number:** **451**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,748</b>	<b>12,751</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,046</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>55,411</b>	<b>55,411</b>	
Total VCS Capacity (scfh)	<b>58,457</b>	<b>60,011</b>	
VCS Capacity minus PPIVF (scfh)	<b>45,709</b>	<b>47,260</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/27/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOLEY SMITH CURD T4N-R63W-S5 L01**

Consent Decree Tank System Number: **451**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>12,751</b>	<b>12,748</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOLEY SMITH CURD T4N-R63W-S5 L01**

Consent Decree Tank System Number: **451**

**Audit Notes**

The stem work request form (PG 3 of Final Packet pdf) states to install fisher 4660 and versa valve set to shut in HLP HP hi/lo if HLP LP reaches 70 psig; however, nowhere in the job sheets (PGs 18-21 of the Final Packet) does it confirm this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 5), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 70 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOOSE T6N-R64W-S18 L02**

Consent Decree Tank System Number: **602**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FOOSE T6N-R64W-S18 L02_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FOOSE T6N-R64W-S18 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
FOOSE T6N-R64W-S18 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FOOSE T6N-R64W-S18 L02_FINAL PACKET	.pdf	7/11/2018	Work Request
FOOSE T6N-R64W-S18 L02_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FOOSE T6N-R64W-S18 L02_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FOOSE T6N-R64W-S18 L02_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
FOOSE T6N-R64W-S18 L02_1753_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
FOOSE T6N-R64W-S18 L02_1754_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
FOOSE T6N-R64W-S18 L02_1755_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FOOSE T6N-R64W-S18 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FOOSE T6N-R64W-S18 L02**

**Consent Decree Tank System Number:** **602**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,796</b>	<b>7,797</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,661</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>22,115</b>	<b>22,115</b>	
Total VCS Capacity (scfh)	<b>27,776</b>	<b>33,782</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,980</b>	<b>25,984</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOOSE T6N-R64W-S18 L02**

Consent Decree Tank System Number: **602**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.80</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>162.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,753</b>	<b>6,753</b>
Oil Tank Working Rate	<b>569</b>	<b>568</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>7,797</b>	<b>7,796</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOOSE T6N-R64W-S18 L02**

Consent Decree Tank System Number: **602**

**Audit Notes**

The walkdown checklist (FOOSE T6N-R64W-S18 L02\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (FOOSE T6N-R64W-S18 L02\_FINAL PACKET).

The STEM work request document (FOOSE T6N-R64W-S18 L02\_FINAL PACKET, p 3) requests the existing 2" VOC line from the tanks to the KO be replaced with a 3" diameter line. The Job sheet (FOOSE T6N-R64W-S18 L02\_FINAL PACKET, p 23) does not confirm this. The STEM line abandonments form (FOOSE T6N-R64W-S18 L02\_FINAL PACKET, p 27) only confirms the 2" line from the KO to the burners was replaced. The data request from 11/14/2018 confirmed the line was upgraded from 2" to 3."

The STEM work request form (FOOSE T6N-R64W-S18 L02\_FINAL PACKET, p 3) requests that separator 2 have a 2" valve with a 3/4" trim installed. The job sheet (FOOSE T6N-R64W-S18 L02\_FINAL PACKET, p 23) does not confirm this. A1 of the walkdown checklist (FOOSE T6N-R64W-S18 L02\_WALKDOWN) confirms the signed eval (FOOSE T6N-R64W-S18 L02\_SIGNED EVAL) has the correct trim size. Only a 2" valve is able to have a 3/4" trim.

The STEM work request form (FOOSE T6N-R64W-S18 L02\_FINAL PACKET, p 3) requests that the 12 oz. thief hatch on oil tank #2 be upgraded to 16 oz. The job sheet form (FOOSE T6N-R64W-S18 L02\_FINAL PACKET, p 3) does not confirm upgrading these. However, the walkdown checklist confirms the thief hatches and PRV's are all at 16 oz.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOSS T6N-R63W-S6 L02**

Consent Decree Tank System Number: **1824**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FOSS T6N-R63W-S6 L02_FINAL PACKET	.pdf	4/3/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FOSS T6N-R63W-S6 L02_STEM Engineering Evaluation_rev1	.xlsm	6/29/2017	STEM Engineering Evaluation Spreadsheet
FOSS T6N-R63W-S6 L02_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FOSS T6N-R63W-S6 L02_FINAL PACKET	.pdf	4/3/2018	Work Request
FOSS T6N-R63W-S6 L02_FINAL PACKET	.pdf	4/3/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FOSS T6N-R63W-S6 L02_WALKDOWN	.pdf	6/13/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FOSS T6N-R63W-S6 L02_IR VERIFICATION	.pdf	6/12/2017	IR Verification Field Data Sheet
FOSS T6N-R63W-S6 L02_2113_NORMAL	.mp4	6/8/2017	IR Camera Video Normal Operations
FOSS T6N-R63W-S6 L02_2114_DUMP	.mp4	6/8/2017	IR Camera Video During Dump Event
FOSS T6N-R63W-S6 L02_2115_POST	.mp4	6/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FOSS T6N-R63W-S6 L02_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FOSS T6N-R63W-S6 L02**

**Consent Decree Tank System Number:** **1824**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,926</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>6,046</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>20,390</b>	<b>20,390</b>	
Total VCS Capacity (scfh)	<b>26,436</b>	<b>30,776</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,690</b>	<b>25,850</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/7/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/26/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOSS T6N-R63W-S6 L02**

Consent Decree Tank System Number: **1824**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOSS T6N-R63W-S6 L02**

Consent Decree Tank System Number: **1824**

**Audit Notes**

The walkdown checklist (FOSS T6N-R63W-S6 L02\_WALKDOWN) was not checked as being complete. Completion was verified through other documentation in the final packet (FOSS T6N-R63W-S6 L02\_FINAL PACKET)

The LP separator was modeled in the signed evaluation with a 1" valve with 1/2 trim. The walkdown checklist (FOSS T6N-R63W-S6 L02\_WALKDOWN, p 1) item A1 confirms the trim sizes (1/2") on the signed eval (FOSS T6N-R63W-S6 L02\_SIGNED EVAL, p 2) are correct. There was no confirmation that the valve size was changed from the original 2" size. A 2" valve was used in these calculations to be conservative. It is unknown if the modeling guideline was strictly followed for the tank system.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOSTER UPRR PAN AM T3N-R65W-S35 L01**

Consent Decree Tank System Number: **417**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FOSTER UPRR PAN AM T3N-R65W-S35 L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FOSTER UPRR PAN AM T3N-R65W-S35 L01_STEM Engineering Evaluation_rev1	.xls	8/18/2017	STEM Engineering Evaluation Spreadsheet
FOSTER UPRR PAN AM T3N-R65W-S35 L01_SIGNED EVAL	.pdf	8/29/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FOSTER UPRR PAN AM T3N-R65W-S35 L01_FINAL PACKET	.pdf	8/4/2017	Work Request
FOSTER UPRR PAN AM T3N-R65W-S35 L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FOSTER UPRR PAN AM T3N-R65W-S35 L01_WALKDOWN	.pdf	8/4/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FOSTER UPRR PAN AM T3N-R65W-S35 L01_IR VERIFICATION	.pdf	8/3/2017	IR Verification Field Data Sheet
FOSTER UPRR PAN AM T3N-R65W-S35 L01_2202_NORMAL	.mp4	8/2/2017	IR Camera Video Normal Operations
FOSTER UPRR PAN AM T3N-R65W-S35 L01_2203_DUMP	.mp4	8/2/2017	IR Camera Video During Dump Event
FOSTER UPRR PAN AM T3N-R65W-S35 L01_2204_POST	.mp4	8/2/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FOSTER UPRR PAN AM T3N-R65W-S35 L01_SIGNED EVAL	.pdf	8/29/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOSTER UPRR PAN AM T3N-R65W-S35 L01**

Consent Decree Tank System Number: **417**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,926</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>2,413</b>	<b>2,413</b>	
Total VCS Capacity (scfh)	<b>6,339</b>	<b>7,371</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,257</b>	<b>3,288</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/6/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOSTER UPRR PAN AM T3N-R65W-S35 L01**

Consent Decree Tank System Number: **417**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FOSTER UPRR PAN AM T3N-R65W-S35 L01**

Consent Decree Tank System Number: **417**

**Audit Notes**

There is conflicting data regarding the separators on site. The work request states to remove unused separator 3 (SN 1752) from site however the job sheets do not confirm this task was completed. Also in the job sheets it states a new d grade separator was installed (SN 70699) associated with all the wells on site however it cannot be inferred if it is a LP or HP

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 6/1/2017, field verification confirmed that the original separator remains in use (confirmed by serial number listed in the facility walkdown). An engineering review of this facility was completed on or around 9/17/2018, this review confirmed the material transfer form in the final packet is incorrect in saying a new d-grade separator was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK MOSER T3N-R65W-S22 L01**

Consent Decree Tank System Number: **406**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FRANK MOSER T3N-R65W-S22 L01_FINAL PACKET	.pdf	10/5/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FRANK MOSER T3N-R65W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	1/10/2018	STEM Engineering Evaluation Spreadsheet
FRANK MOSER T3N-R65W-S22 L01_SIGNED EVAL	.pdf	5/7/2015	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FRANK MOSER T3N-R65W-S22 L01_FINAL PACKET	.pdf	10/5/2015	Work Request
FRANK MOSER T3N-R65W-S22 L01_FINAL PACKET	.pdf	10/5/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FRANK MOSER T3N-R65W-S22 L01_WALKDOWN	.pdf	10/5/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FRANK MOSER T3N-R65W-S22 L01_IR VERIFICATION	.pdf	10/2/2015	IR Verification Field Data Sheet
FRANK MOSER T3N-R65W-S22 L01_0306_NORMAL	.mp4	10/1/2015	IR Camera Video Normal Operations
FRANK MOSER T3N-R65W-S22 L01_0308_DUMP	.mp4	10/1/2015	IR Camera Video During Dump Event
FRANK MOSER T3N-R65W-S22 L01_0309_POST	.mp4	10/1/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FRANK MOSER T3N-R65W-S22 L01_SIGNED EVAL	.pdf	5/7/2015	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FRANK MOSER T3N-R65W-S22 L01**

**Consent Decree Tank System Number:** **406**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,888</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>3,872</b>	<b>3,872</b>	
Total VCS Capacity (scfh)	<b>7,760</b>	<b>10,414</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,014</b>	<b>5,667</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/12/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/16/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK MOSER T3N-R65W-S22 L01**

Consent Decree Tank System Number: **406**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

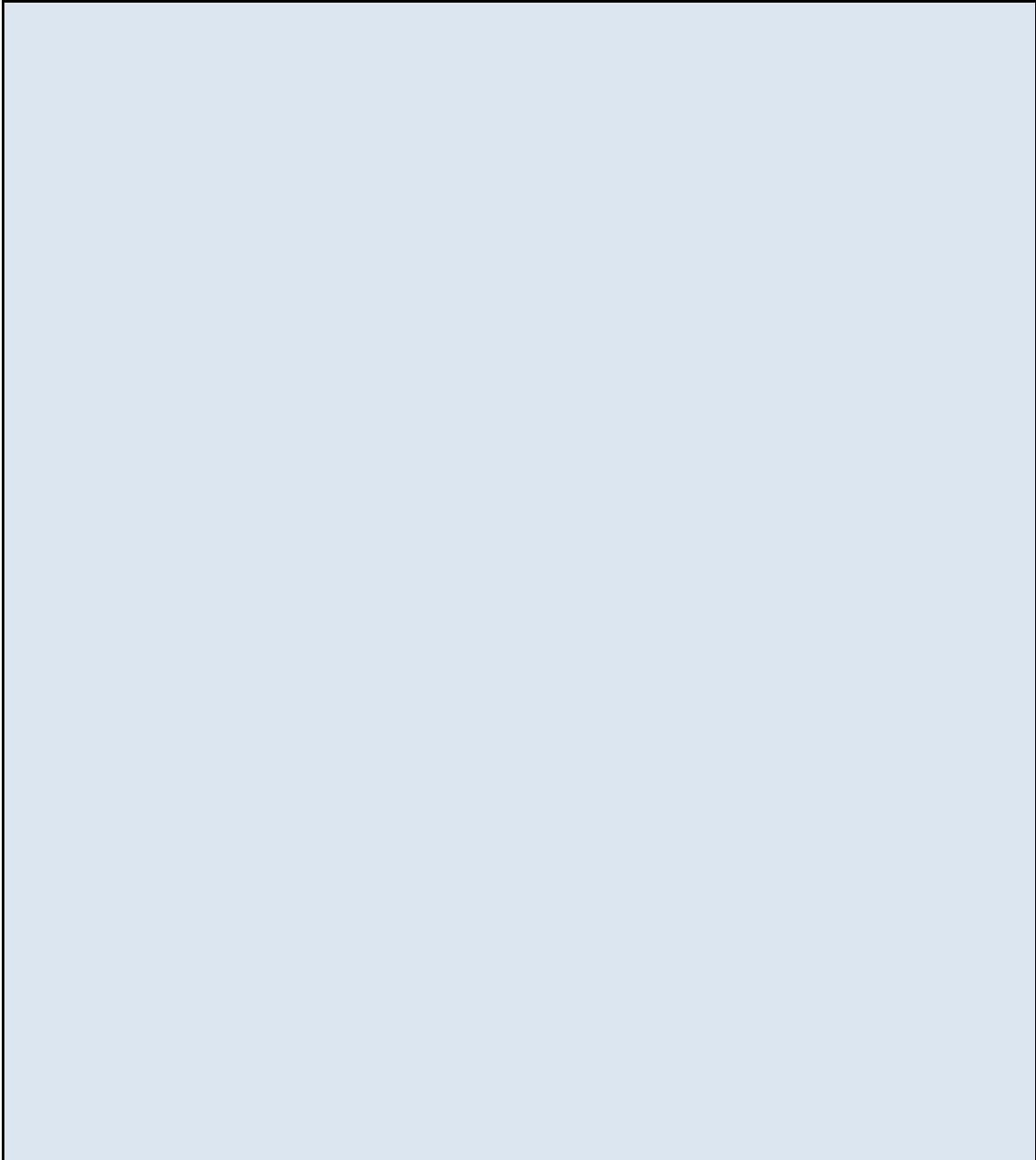
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK MOSER T3N-R65W-S22 L01**

Consent Decree Tank System Number: **406**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK T4N-R63W-S7 L01**

Consent Decree Tank System Number: **450**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FRANK T4N-R63W-S7 L01_FINAL PACKET	.pdf	1/26/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R63W-S7 L01_STEM Engineering Evaluation_rev1	.xlsm	3/6/2017	STEM Engineering Evaluation Spreadsheet
FRANK T4N-R63W-S7 L01_SIGNED EVAL	.pdf	3/7/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R63W-S7 L01_FINAL PACKET	.pdf	1/26/2017	Work Request
FRANK T4N-R63W-S7 L01_FINAL PACKET	.pdf	1/26/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R63W-S7 L01_WALKDOWN	.pdf	1/26/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R63W-S7 L01_IR VERIFICATION	.pdf	1/24/2017	IR Verification Field Data Sheet
FRANK T4N-R63W-S7 L01_1263_NORMAL	.mp4	1/18/2017	IR Camera Video Normal Operations
FRANK T4N-R63W-S7 L01_1264_DUMP	.mp4	1/18/2017	IR Camera Video During Dump Event
FRANK T4N-R63W-S7 L01_1265_POST	.mp4	1/18/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R63W-S7 L01_SIGNED EVAL	.pdf	3/7/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FRANK T4N-R63W-S7 L01**

**Consent Decree Tank System Number:** **450**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,820</b>	<b>13,822</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>33,513</b>	<b>33,513</b>	
Total VCS Capacity (scfh)	<b>36,884</b>	<b>38,113</b>	
VCS Capacity minus PPIVF (scfh)	<b>23,064</b>	<b>24,291</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/27/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK T4N-R63W-S7 L01**

Consent Decree Tank System Number: **450**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.50</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.61</b>							
Gas/Oil Ratio (scf/bbl)	<b>256.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>601</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>153</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1184</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>303.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>11</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>12,639</b>	<b>12,639</b>
Oil Tank Working Rate	<b>469</b>	<b>468</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>13,822</b>	<b>13,820</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK T4N-R63W-S7 L01**

Consent Decree Tank System Number: **450**

**Audit Notes**

The walkdown checklist (FRANK T4N-R63W-S7 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (FRANK T4N-R63W-S7 L01\_FINAL PACKET).

A Work Order (FRANK T4N-R63W-S7 L01\_FINAL PACKET, p 3) request was issued to "bottom out" east-most oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was bottomed out. Additionally, the provided STEM Retrofit Walkdown Checklist (FRANK T4N-R63W-S7 L01\_WALKDOWN, p3), Item C13, was checked "N/A". The data request response provided 11/14/2018 confirmed that one tank was converted to a headspace tank.

The separator pneumatic PSHH is set by the operator not automation and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 140 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK T4N-R64W-S12 L02**

Consent Decree Tank System Number: **744**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FRANK T4N-R64W-S12 L02_FINAL PACKET	.pdf	3/30/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R64W-S12 L02_STEM Engineering Evaluation_rev1	.xlsm	4/4/2017	STEM Engineering Evaluation Spreadsheet
FRANK T4N-R64W-S12 L02_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R64W-S12 L02_FINAL PACKET	.pdf	3/30/2017	Work Request
FRANK T4N-R64W-S12 L02_FINAL PACKET	.pdf	3/30/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R64W-S12 L02_WALKDOWN	.pdf	3/30/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R64W-S12 L02_IR VERIFICATION	.pdf	3/30/2017	IR Verification Field Data Sheet
FRANK T4N-R64W-S12 L02_1890_NORMAL	.mp4	3/23/2017	IR Camera Video Normal Operations
FRANK T4N-R64W-S12 L02_1891_DUMP	.mp4	3/23/2017	IR Camera Video During Dump Event
FRANK T4N-R64W-S12 L02_1892_POST	.mp4	3/23/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FRANK T4N-R64W-S12 L02_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FRANK T4N-R64W-S12 L02**

**Consent Decree Tank System Number:** **744**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>115</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,223</b>	<b>5,531</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
Headspace Surge Capacity (scfh)	<b>13</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>6,711</b>	<b>10,792</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,488</b>	<b>5,261</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/3/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK T4N-R64W-S12 L02**

Consent Decree Tank System Number: **744**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.30</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.41</b>							
Gas/Oil Ratio (scf/bbl)	<b>198.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>579</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>128</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>610</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>121.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>6</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>5,051</b>	<b>4,758</b>
Oil Tank Working Rate	<b>242</b>	<b>227</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,531</b>	<b>5,223</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANK T4N-R64W-S12 L02**

Consent Decree Tank System Number: **744**

**Audit Notes**

The walkdown checklist (FRANK T4N-R64W-S12 L02\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (FRANK T4N-R64W-S12 L02\_FINAL PACKET).

The STEM Request form (FRANK T4N-R64W-S12 L02\_FINAL PACKET, p 3) requests that the existing separator on site be replaced with a new separator. A1 from the walkdown checklist (FRANK T4N-R64W-S12 L02\_WALKDOWN, p 1) confirms that the trim size in the signed evaluation (FRANK T4N-R64W-S12 L02\_SIGNED EVAL, p 2) is correct. There is no mention of the new separator's valve size, so a 2" valve was used to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

The separator pneumatic PSHH is set by the operator not automation and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 115 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANKLIN T4N-R64W-S7 L01**

Consent Decree Tank System Number: **626**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
FRANKLIN T4N-R64W-S7 L01_FINAL PACKET	PDF	NO DATE	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
FRANKLIN T4N-R64W-S7 L01_SIGNED EVAL	PDF	7/17/2017	STEM Engineering Evaluation Spreadsheet
FRANKLIN T4N-R64W-S7 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/14/2017	STEM Engineering Evaluation Spreadsheet

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
FRANKLIN T4N-R64W-S7 L01_FINAL PACKET	PDF	3/15/2016	Work Request
FRANKLIN T4N-R64W-S7 L01_FINAL PACKET	PDF	6/10/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
FRANKLIN T4N-R64W-S7 L01_FINAL PACKET	PDF	6/28/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
FRANKLIN T4N-R64W-S7 L01_FINAL PACKET	PDF	6/28/2017	IR Verification Field Data Sheet
FRANKLIN T4N-R64W-S7 L01_1203_NORMAL	MP4	6/28/2017	IR Camera Video Normal Operations
FRANKLIN T4N-R64W-S7 L01_1204_DUMP	MP4	6/28/2017	IR Camera Video During Dump Event
FRANKLIN T4N-R64W-S7 L01_1205_POST	MP4	6/28/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
FRANKLIN T4N-R64W-S7 L01_SIGNED EVAL	PDF	7/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FRANKLIN T4N-R64W-S7 L01**

**Consent Decree Tank System Number:** **626**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,986</b>	<b>7,987</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,881</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>22,823</b>	<b>22,823</b>	
Total VCS Capacity (scfh)	<b>25,704</b>	<b>28,656</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,718</b>	<b>20,669</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Erin Ehrmantraut  
 Audit Document Review Date: 11/8/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/4/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANKLIN T4N-R64W-S7 L01**

Consent Decree Tank System Number: **626**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>34</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,987</b>	<b>7,986</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRANKLIN T4N-R64W-S7 L01**

Consent Decree Tank System Number: **626**

**Audit Notes**

All inputs values and documentation were reviewed. No notes were required.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRENCH HAMMERBECK T6N-R64W-S33 L01**

Consent Decree Tank System Number: **2132**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FRENCH HAMMERBECK T6N-R64W-S33 L01_FINAL PACKET	.pdf	11/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FRENCH HAMMERBECK T6N-R64W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	6/27/2017	STEM Engineering Evaluation Spreadsheet
FRENCH HAMMERBECK T6N-R64W-S33 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FRENCH HAMMERBECK T6N-R64W-S33 L01_FINAL PACKET	.pdf	11/30/2015	Work Request
FRENCH HAMMERBECK T6N-R64W-S33 L01_FINAL PACKET	.pdf	11/30/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FRENCH HAMMERBECK T6N-R64W-S33 L01_WALKDOWN	.pdf	11/30/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FRENCH HAMMERBECK T6N-R64W-S33 L01_IR VERIFICATION	.pdf	11/30/2015	IR Verification Field Data Sheet
FRENCH HAMMERBECK T6N-R64W-S33 L01_0460_NORMAL	.mp4	11/24/2015	IR Camera Video Normal Operations
FRENCH HAMMERBECK T6N-R64W-S33 L01_0461_DUMP	.mp4	11/24/2015	IR Camera Video During Dump Event
FRENCH HAMMERBECK T6N-R64W-S33 L01_0462_POST	.mp4	11/24/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FRENCH HAMMERBECK T6N-R64W-S33 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FRENCH HAMMERBECK T6N-R64W-S33 L01**

**Consent Decree Tank System Number:** **2132**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,271</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,016</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>285</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>5,301</b>	<b>6,542</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,030</b>	<b>2,270</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/7/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/26/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRENCH HAMMERBECK T6N-R64W-S33 L01**

Consent Decree Tank System Number: **2132**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,271</b>	<b>4,271</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRENCH HAMMERBECK T6N-R64W-S33 L01**

Consent Decree Tank System Number: **2132**

**Audit Notes**

The walkdown checklist (FRENCH HAMMERBECK T6N-R64W-S33 L01\_WALKDOWN) was not marked as being complete. Completion was verified with other documentation in the final packet (FRENCH HAMMERBECK T6N-R64W-S33 L01\_FINAL PACKET).

This site was selected for additional IR filming because the whole facility was panned over very quickly. No video was longer than 65 seconds.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRENZEL T5N-R64W-S15 L01**

Consent Decree Tank System Number: **312**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FRENZEL T5N-R64W-S15 L01_FINAL PACKET	.pdf	11/18/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FRENZEL T5N-R64W-S15 L01_STEM Engineering Evaluation_rev1	.xlsm	1/12/2018	STEM Engineering Evaluation Spreadsheet
FRENZEL T5N-R64W-S15 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FRENZEL T5N-R64W-S15 L01_FINAL PACKET	.pdf	11/18/2015	Work Request
FRENZEL T5N-R64W-S15 L01_FINAL PACKET	.pdf	11/18/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FRENZEL T5N-R64W-S15 L01_WALKDOWN	.pdf	11/18/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FRENZEL T5N-R64W-S15 L01_IR VERIFICATION	.pdf	11/17/2015	IR Verification Field Data Sheet
FRENZEL T5N-R64W-S15 L01_0450_NORMAL	.mp4	11/16/2015	IR Camera Video Normal Operations
FRENZEL T5N-R64W-S15 L01_0451_DUMP	.mp4	11/16/2015	IR Camera Video During Dump Event
FRENZEL T5N-R64W-S15 L01_0452_POST	.mp4	11/16/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FRENZEL T5N-R64W-S15 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FRENZEL T5N-R64W-S15 L01**

**Consent Decree Tank System Number:** **312**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,243</b>	<b>4,083</b>	<b>-4%</b>
Calculated Burner Capacity (scfh)	<b>4,088</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,221</b>	<b>2,221</b>	
Total VCS Capacity (scfh)	<b>6,309</b>	<b>6,821</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,066</b>	<b>2,738</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/2/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/5/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRENZEL T5N-R64W-S15 L01**

Consent Decree Tank System Number: **312**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,454
Oil Tank Working Rate	301	314
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,083</b>	<b>4,243</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRENZEL T5N-R64W-S15 L01**

Consent Decree Tank System Number: **312**

**Audit Notes**

The STEM Engineering Evaluation was modeled with a 2" valve w/. 1/2" trim, however the work request (FINAL PACKET p 3-4) states that the valve should be replaced with a 1" w/. 1/2" trim. The job sheet (FINAL PACKET p. 23) confirms that the valve installed was a 1" w/. 1/2" trim. The modeling guideline was still strictly followed because the engineering evaluation calculated a higher PPIVF than the actual valve on site

This site has been selected for IR camera inspection due to high line pressure.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRICK T4N-R64W-S18 L01**

Consent Decree Tank System Number: **625**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FRICK T4N-R64W-S18 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FRICK T4N-R64W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
FRICK T4N-R64W-S18 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FRICK T4N-R64W-S18 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
FRICK T4N-R64W-S18 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FRICK T4N-R64W-S18 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FRICK T4N-R64W-S18 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
FRICK T4N-R64W-S18 L01_1434_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
FRICK T4N-R64W-S18 L01_1435_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
FRICK T4N-R64W-S18 L01_1436_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FRICK T4N-R64W-S18 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FRICK T4N-R64W-S18 L01**

**Consent Decree Tank System Number:** **625**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,749</b>	<b>7,929</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>5,247</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>26,185</b>	<b>26,185</b>	
Total VCS Capacity (scfh)	<b>31,432</b>	<b>37,852</b>	
VCS Capacity minus PPIVF (scfh)	<b>23,683</b>	<b>29,923</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 8/15/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRICK T4N-R64W-S18 L01**

Consent Decree Tank System Number: **625**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>29</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>7,929</b>	<b>7,749</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRICK T4N-R64W-S18 L01**

Consent Decree Tank System Number: **625**

**Audit Notes**

The walkdown checklist (FRICK T4N-R64W-S18 L01\_WALKDOWN) is not marked as being complete. Completion was verified through other documentation in the final packet (FRICK T4N-R64W-S18 L01\_FINAL PACKET).

This site was selected to be re-filmed because the PRV's were not shown well in any of the 3 videos.

The STEM work request document (FRICK T4N-R64W-S18 L01\_FINAL PACKET, p 3) requests that all existing 14 oz. Wellmark PRV's be replaced with 16 oz. Morrison PRVs. The Job sheet ((RICK T4N-R64W-S18 L01\_FINAL PACKET, p 39) does not mention upgrading the thief hatches. The walkdown checklist (FRICK T4N-R64W-S18 L01\_WALKDOWN) confirms the thief hatches are all 16 oz.

The STEM work request document (FRICK T4N-R64W-S18 L01\_FINAL PACKET, p 3) requests that the existing 212 dump valve be replaced with a 1" 1400 with 1/2" trim. The walkdown checklist item A1 confirms the valve trim was changed but the valve size could not be confirmed. the largest valve size with a 1/2" trim was used in these calculations to be conservative.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2214**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/14/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	3/23/2018	STEM Engineering Evaluation Spreadsheet
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_SIGNED EVAL	.pdf	3/28/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/14/2017	Work Request
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/14/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_WALKDOWN	.pdf	9/14/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_IR VERIFICATION	.pdf	3/19/2018	IR Verification Field Data Sheet
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_4728_NORMAL	.mp4	9/8/2017	IR Camera Video Normal Operations
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_4729_DUMP	.mp4	9/8/2017	IR Camera Video During Dump Event
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_4730_POST	.mp4	9/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01_SIGNED EVAL	.pdf	3/28/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01**

**Consent Decree Tank System Number:** **2214**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>2,763</b>	<b>2,763</b>	
Total VCS Capacity (scfh)	<b>6,761</b>	<b>7,721</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,253</b>	<b>3,212</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 6/29/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/9/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2214**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRISBIE WRIGHT SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2214**

**Audit Notes**

A new HLP separator was installed in place of the double glycol unit. There is no information indicating whether the dump valve with the glycol unit was then installed with the new HLP unit. For purposes of this evaluation, it is assumed the existing valve was installed with the new HLP separator.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRITZLER T2N-R64W-S34 L01**

Consent Decree Tank System Number: **2302**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FRITZLER T2N-R64W-S34 L01_FINAL PACKET	pdf	6/13/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FRITZLER T2N-R64W-S34 L01_SIGNED EVAL	pdf	6/14/2017	Final Signed Engineering Evaluation
FRITZLER T2N-R64W-S34 L01_STEM Engineering Evaluation_rev1	xlsm	6/14/2017	STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
FRITZLER T2N-R64W-S34 L01_FINAL PACKET	pdf	6/13/2017	Work Request
FRITZLER T2N-R64W-S34 L01_FINAL PACKET	pdf	6/13/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FRITZLER T2N-R64W-S34 L01_WALKDOWN	pdf	6/9/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FRITZLER T2N-R64W-S34 L01_2116_NORMAL	mp4	6/9/2017	IR Camera Video Normal Operations
FRITZLER T2N-R64W-S34 L01_2117_DUMP	mp4	6/9/2017	IR Camera Video During Dump Event
FRITZLER T2N-R64W-S34 L01_2118_POST	mp4	6/9/2017	IR Camera Video Post Dump Event
FRITZLER T2N-R64W-S34 L01_IR VERIFICATION	pdf	6/9/2017	IR Verification Field Data Sheet

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FRITZLER T2N-R64W-S34 L01_SIGNED EVAL	pdf	6/14/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRITZLER T2N-R64W-S34 L01**

Consent Decree Tank System Number: **2302**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>516</b>	<b>528</b>	
Total VCS Capacity (scfh)	<b>4,543</b>	<b>5,486</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,099</b>	<b>1,899</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 11/7/2017

Audit Document Review Verified by: K. Malmquist

Audit Document Verification Date: 12/31/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRITZLER T2N-R64W-S34 L01**

Consent Decree Tank System Number: **2302**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C)	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FRITZLER T2N-R64W-S34 L01**

Consent Decree Tank System Number: **2302**

**Audit Notes**

**1. Unable to confirm separator oil dump valve size - Request additional data**

The Job Sheets (Final Packet pg 32 & 34) indicate a new HLP Separator was installed onsite. Item A1 of the Walkdown Checklist (Final Packet pg 38) indicates the correct trim size (1/2") is installed on the HLP Separator, however, documentation is not provided indicating the size of the oil dump valve.

The "Standard Design 125# HLP Design" separator P&ID (Final Packet pg 9) indicates 2" dump valve size. The Final Design Packet was run with a 1" valve size (see Audit pg 2 of this audit packet), which would underestimate PPIVFR. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**2. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 13-20) are not dated. Assumed the date is the same as Facility Scouting date (9/2/16).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FURROW FED T7N-R64W-S14 L01**

Consent Decree Tank System Number: **577**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FURROW FED T7N-R64W-S14 L01_STEM Engineering Evaluation_rev1	.xlsm	8/27/2018	STEM Engineering Evaluation Spreadsheet
FURROW FED T7N-R64W-S14 L01_SIGNED EVAL	.pdf	6/29/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FURROW FED T7N-R64W-S14 L01_FINAL PACKET	.pdf	7/20/2016	Work Request
FURROW FED T7N-R64W-S14 L01_FINAL PACKET	.pdf	7/20/2016	Truck Vent Capture Work Scope

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
2018 Draft Attachments to Comment Letter	.pdf	3/27/2020	Facility walkdown
RE: Audit Questions	.msg	8/26/2020	VOC line size confirmation email

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FURROW FED T7N-R64W-S14 L01_IR VERIFICATION	.pdf	7/14/2016	IR Verification Field Data Sheet
FURROW FED T7N-R64W-S14 L01_1281_NORMAL	.mp4	7/14/2016	IR Camera Video Normal Operations
FURROW FED T7N-R64W-S14 L01_1282_DUMP	.mp4	7/14/2016	IR Camera Video During Dump Event
FURROW FED T7N-R64W-S14 L01_1283_POST	.mp4	7/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FURROW FED T7N-R64W-S14 L01_SIGNED EVAL	.pdf	6/29/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FURROW FED T7N-R64W-S14 L01**

**Consent Decree Tank System Number:** **577**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>8</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>4</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>4</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>				

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>4</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>28,535</b>	<b>29,551</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>14,890</b>	<b>18,212</b>	
Headspace Surge Capacity (scfh)	<b>18,792</b>	<b>18,792</b>	
Total VCS Capacity (scfh)	<b>33,682</b>	<b>37,004</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,147</b>	<b>7,453</b>	

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwein  
 Audit Document Review Date: 12/10/2018  
 Audit Document Review Verified by: Angela M. Oberlander & James Van Horne  
 Audit Document Verification Date: 12/19/2018 & 8/12/2020



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FURROW FED T7N-R64W-S14 L01**

Consent Decree Tank System Number: **577**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61	0.61	0.61				
Z2	-0.86	-0.86	-0.86	-0.86				
Z3	0.98	0.98	0.98	0.98				
Z	0.72	0.72	0.72	0.72				
Gas/Oil Ratio (scf/bbl)	96.4	96.4	96.4	96.4				

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78	0.78				
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20	7.20				
Critical Pressure (psia) <sup>b</sup>	530	530	530	530				
Vapor Pressure (psia) <sup>c</sup>	73	73	73	73				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86	0.86	0.86				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bopd) <sup>f,g</sup>	759	759	759	759				

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2	73.2	73.2	73.2				
Working Flow (Mscfd) <sup>h,i</sup>	7	7	7	7				

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200	3200	3200
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1	1	1
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak Flow (bwpd) <sup>f,g</sup>	1629	1629	1629	1629	3906	3906	3906	3906

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	7	7	7	7	16	16	16	16
Working Flow (Mscfd) <sup>l</sup>	9	9	9	9	22	22	22	22

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>i</sup>	396	396
Mscfd	76	38

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	12,195	11,676
Oil Tank Working Rate	1,204	1,150
Water Tank Flash Rate	3,690	3,506
Water Tank Working Rate	5,180	4,921
Tank Breathing Rate	4,755	4,755
Truck Loading Vapor	2,527	2,527
Total	29,551	28,535

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FURROW FED T7N-R64W-S14 L01**

Consent Decree Tank System Number: **577**

**Audit Notes**

The VOC line size from the tanks to the knockout is listed on the field sheet as "2-5." It is unknown if this refers to the combustor number on the field sheet or the size of the voc line. Noble confirmed in an email date 8/26/2020 that field verified that the VOC line size from the tanks to the Knockout is 3 inches.

The separator pneumatic PSHH is set by the operator, not automation, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 60 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

The model of Cimarron combustors used were not provided however based on the IR camera footage they appear to be 48HV.

The field data indicated the oil and water dump valves are 2 inch valves with 1/2 inch trims. The signed evaluation was completed with 1 inch valves which results in a lower PPIVFR than a 2 inch valve. As a result the modeling guideline has not been applied correctly.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FURROW USX T7N-R64W-S15 L02**

Consent Decree Tank System Number: **573**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
FURROW USX T7N-R64W-S15 L02_FINAL PACKET	.pdf	8/7/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
FURROW USX T7N-R64W-S15 L02_STEM Engineering Evaluation_rev1	.xlsm	1/10/2018	STEM Engineering Evaluation Spreadsheet
FURROW USX T7N-R64W-S15 L02_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
FURROW USX T7N-R64W-S15 L02_FINAL PACKET	.pdf	8/7/2015	Work Request
FURROW USX T7N-R64W-S15 L02_FINAL PACKET	.pdf	8/7/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
FURROW USX T7N-R64W-S15 L02_WALKDOWN	.pdf	8/7/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
FURROW USX T7N-R64W-S15 L02_IR VERIFICATION	.pdf	8/7/2015	IR Verification Field Data Sheet
FURROW USX T7N-R64W-S15 L02_0206_NORMAL	.mp4	8/6/2015	IR Camera Video Normal Operations
FURROW USX T7N-R64W-S15 L02_0207_DUMP	.mp4	8/6/2015	IR Camera Video During Dump Event
FURROW USX T7N-R64W-S15 L02_0208_POST	.mp4	8/6/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
FURROW USX T7N-R64W-S15 L02_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **FURROW USX T7N-R64W-S15 L02**

**Consent Decree Tank System Number:** **573**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,459</b>	<b>5,460</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,881</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>11,007</b>	<b>11,007</b>	
Total VCS Capacity (scfh)	<b>13,888</b>	<b>16,840</b>	
VCS Capacity minus PPIVF (scfh)	<b>8,429</b>	<b>11,380</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/25/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/25/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FURROW USX T7N-R64W-S15 L02**

Consent Decree Tank System Number: **573**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>34</b>	<b>0</b>

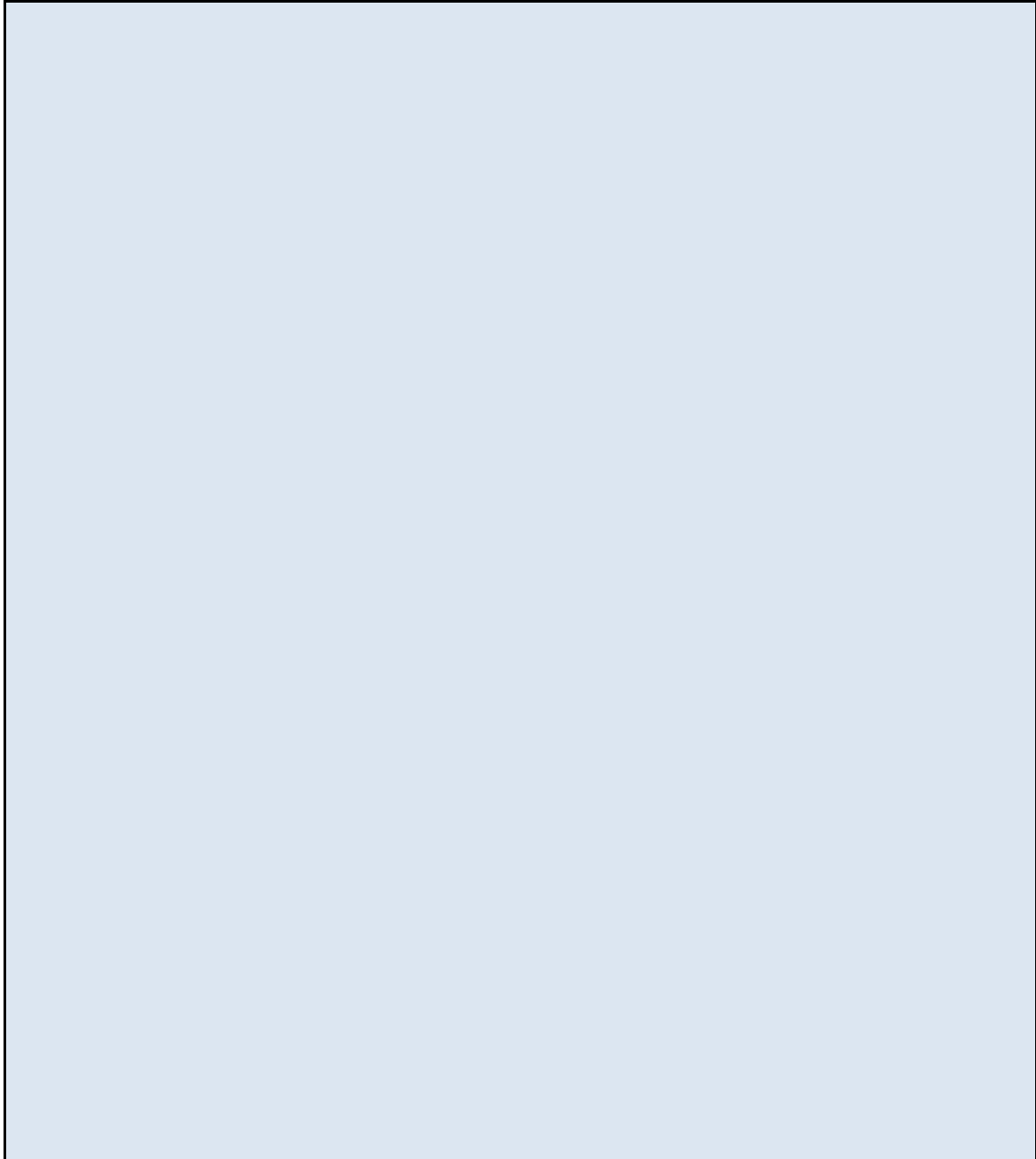
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,460</b>	<b>5,459</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **FURROW USX T7N-R64W-S15 L02**

Consent Decree Tank System Number: **573**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI T5N-R64W-S31 L01**

Consent Decree Tank System Number: **1084**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GEMINI T5N-R64W-S31 L01_FINAL PACKET	.pdf	2/17/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GEMINI T5N-R64W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	12/20/2016	STEM Engineering Evaluation Spreadsheet
GEMINI T5N-R64W-S31 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GEMINI T5N-R64W-S31 L01_FINAL PACKET	.pdf	2/17/2016	Work Request
GEMINI T5N-R64W-S31 L01_FINAL PACKET	.pdf	2/17/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GEMINI T5N-R64W-S31 L01_FINAL PACKET	.pdf	2/17/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GEMINI T5N-R64W-S31 L01_IR VERIFICATION	.pdf	2/12/2016	IR Verification Field Data Sheet
GEMINI T5N-R64W-S31 L01_0686_NORMAL	.mp4	2/11/2016	IR Camera Video Normal Operations
GEMINI T5N-R64W-S31 L01_0687_DUMP	.mp4	2/11/2016	IR Camera Video During Dump Event
GEMINI T5N-R64W-S31 L01_0688_POST	.mp4	2/11/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GEMINI T5N-R64W-S31 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GEMINI T5N-R64W-S31 L01**

**Consent Decree Tank System Number:** **1084**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,878</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>820</b>	<b>820</b>	
Total VCS Capacity (scfh)	<b>4,698</b>	<b>5,373</b>	
VCS Capacity minus PPIVF (scfh)	<b>853</b>	<b>1,528</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 2/27/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI T5N-R64W-S31 L01**

Consent Decree Tank System Number: **1084**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

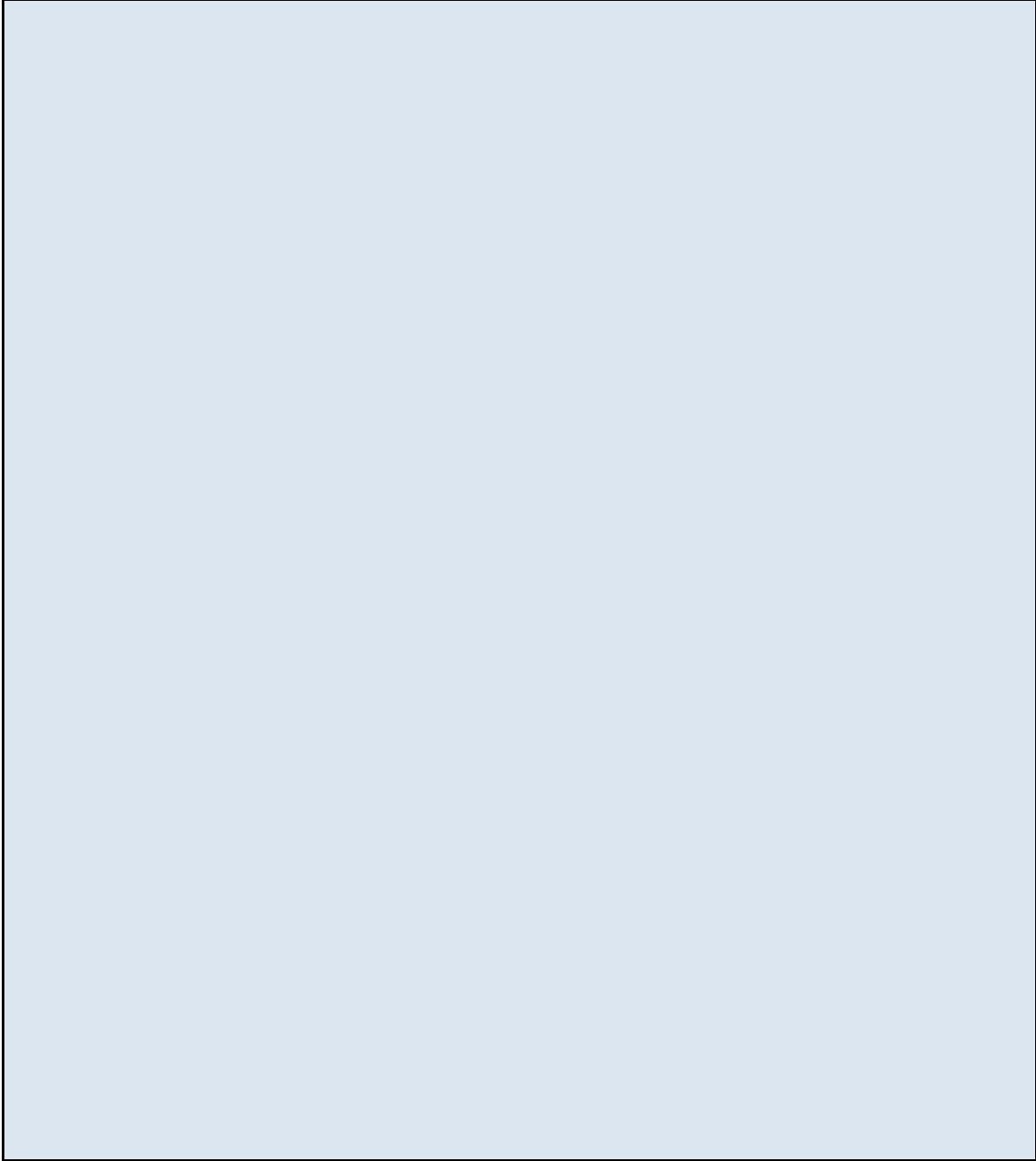
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,845</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI T5N-R64W-S31 L01**

Consent Decree Tank System Number: **1084**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI THISTLE DOWN T5N-R64W-S31 L01**

Consent Decree Tank System Number: **320**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GEMINI THISTLE DOWN T5N-R64W-S31 L01_FINAL PACKET	.pdf	6/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GEMINI THISTLE DOWN T5N-R64W-S31 L01_STEM Engineering Evaluation_rev1	.xls	6/15/2016	STEM Engineering Evaluation Spreadsheet
GEMINI THISTLE DOWN T5N-R64W-S31 L01_SIGNED EVAL	.pdf	6/17/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GEMINI THISTLE DOWN T5N-R64W-S31 L01_FINAL PACKET	.pdf	6/16/2016	Work Request
GEMINI THISTLE DOWN T5N-R64W-S31 L01_FINAL PACKET	.pdf	6/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GEMINI THISTLE DOWN T5N-R64W-S31 L01_FINAL PACKET	.pdf	6/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GEMINI THISTLE DOWN T5N-R64W-S31 L01_IR VERIFICATION	.pdf	6/14/2016	IR Verification Field Data Sheet
GEMINI THISTLE DOWN T5N-R64W-S31 L01_1123_NORMAL	.mp4	6/9/2016	IR Camera Video Normal Operations
GEMINI THISTLE DOWN T5N-R64W-S31 L01_1124_DUMP	.mp4	6/9/2016	IR Camera Video During Dump Event
GEMINI THISTLE DOWN T5N-R64W-S31 L01_1125_POST	.mp4	6/9/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GEMINI THISTLE DOWN T5N-R64W-S31 L01_SIGNED EVAL	.pdf	6/17/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI THISTLE DOWN T5N-R64W-S31 L01**

Consent Decree Tank System Number: **320**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,087</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>6,335</b>	<b>6,335</b>	
Total VCS Capacity (scfh)	<b>10,422</b>	<b>16,768</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,438</b>	<b>11,784</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 2/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/29/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI THISTLE DOWN T5N-R64W-S31 L01**

Consent Decree Tank System Number: **320**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

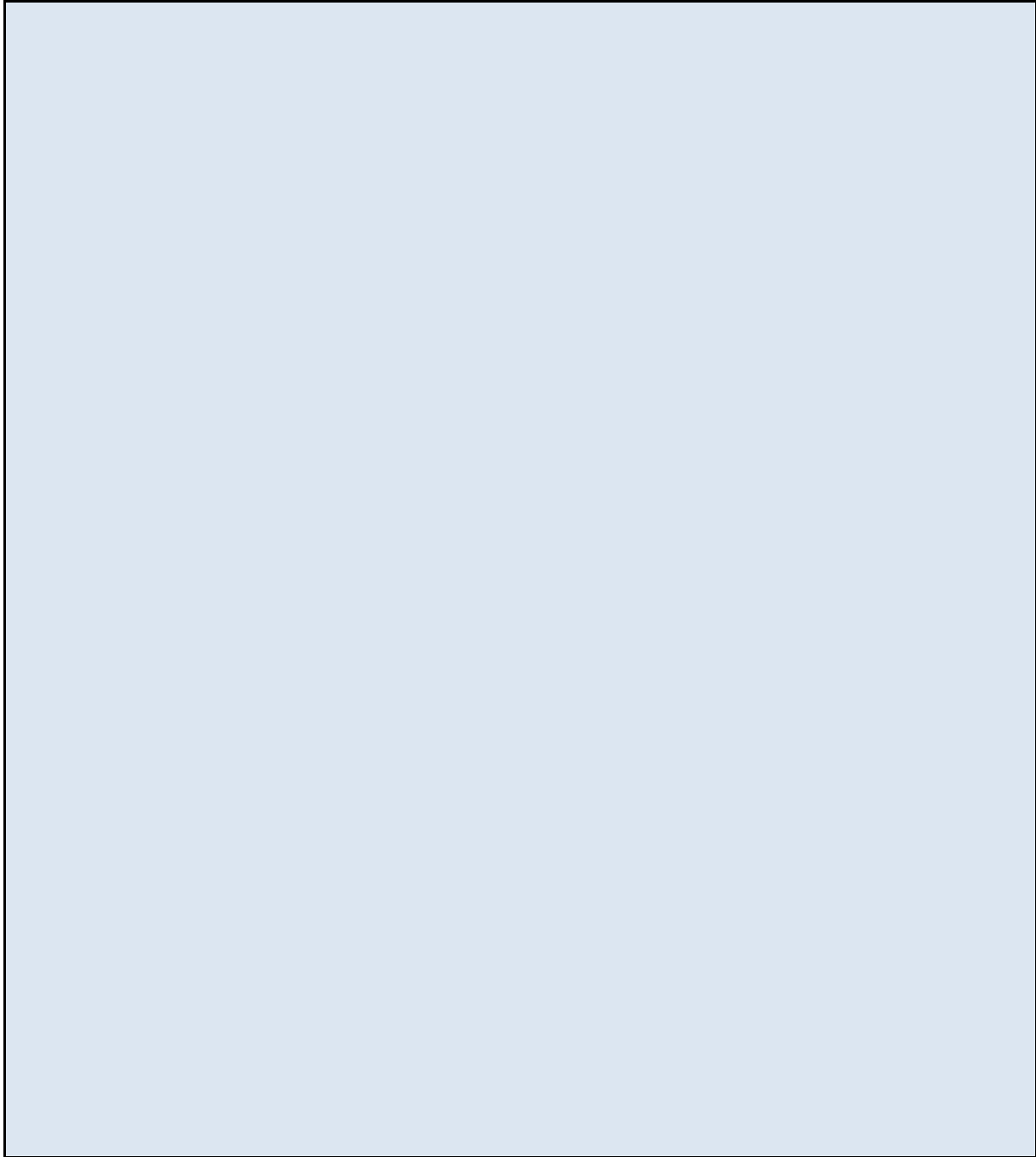
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI THISTLE DOWN T5N-R64W-S31 L01**

Consent Decree Tank System Number: **320**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI WRIGHT GOIN T4N-R64W-S7 L01**

Consent Decree Tank System Number: **610**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_FINAL PACKET	.pdf	11/11/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_STEM Engineering Evaluation_rev1	.xlsm	12/15/2018	STEM Engineering Evaluation Spreadsheet
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_SIGNED EVAL	.pdf	1/6/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_FINAL PACKET	.pdf	11/11/2015	Work Request
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_FINAL PACKET	.pdf	11/11/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_WALKDOWN	.pdf	11/11/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_IR VERIFICATION	.pdf	11/11/2015	IR Verification Field Data Sheet
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_0441_NORMAL	.mp4	11/10/2015	IR Camera Video Normal Operations
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_0442_DUMP	.mp4	11/10/2015	IR Camera Video During Dump Event
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_0443_POST	.mp4	11/10/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GEMINI WRIGHT GOIN T4N-R64W-S7 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GEMINI WRIGHT GOIN T4N-R64W-S7 L01**

**Consent Decree Tank System Number:** **610**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,926</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,370</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>4,424</b>	<b>4,424</b>	
Total VCS Capacity (scfh)	<b>7,794</b>	<b>9,024</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,048</b>	<b>4,098</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 6/29/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI WRIGHT GOIN T4N-R64W-S7 L01**

Consent Decree Tank System Number: **610**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GEMINI WRIGHT GOIN T4N-R64W-S7 L01**

Consent Decree Tank System Number: **610**

**Audit Notes**

The work request form indicates a 4" AGL is to be installed from the KO pot to the burner. There is no documentation provided confirming the line modification was completed. IR videos show an AGL from the VOC KO pot to the burner.

The Work Request indicated the LP oil dump valve was to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on the LP separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GERRITY ST T4N-R65W-S36 L03**

Consent Decree Tank System Number: **690-a**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
GERRITY ST T4N-R65W-S36 L03_FINAL PACKET	.pdf	11/2/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
GERRITY ST T4N-R65W-S36 L03_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
GERRITY ST T4N-R65W-S36 L03_SIGNED EVAL	.pdf	1/10/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
GERRITY ST T4N-R65W-S36 L03_FINAL PACKET	.pdf	11/2/2015	Work Request
GERRITY ST T4N-R65W-S36 L03_FINAL PACKET	.pdf	11/2/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
GERRITY ST T4N-R65W-S36 L03_WALKDOWN	.pdf	10/28/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
GERRITY ST T4N-R65W-S36 L03_IR VERIFICATION	.pdf	10/28/2015	IR Verification Field Data Sheet
GERRITY ST T4N-R65W-S36 L03_0401_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
GERRITY ST T4N-R65W-S36 L03_0402_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
GERRITY ST T4N-R65W-S36 L03_0403_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
GERRITY ST T4N-R65W-S36 L03_SIGNED EVAL	.pdf	1/10/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GERRITY ST T4N-R65W-S36 L03**

Consent Decree Tank System Number: **690-a**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>4,006</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,466</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,466</b>	<b>6,542</b>	
VCS Capacity minus PPIVF (scfh)	<b>621</b>	<b>2,536</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/20/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/18/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GERRITY ST T4N-R65W-S36 L03**

Consent Decree Tank System Number: **690-a**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	794							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	82.9							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,454	3,307
Oil Tank Working Rate	314	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,006</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GERRITY ST T4N-R65W-S36 L03**

Consent Decree Tank System Number: **690-a**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Field Datasheets (Final Packet, pg 8) indicate the HLP separator onsite originally had 2" oil dump valve with unknown trim size. The STEM Work Request Form (Final Packet, pg 3) requests the oil dump valve trim to be replaced with a 1/2" trim and the Engineering Evaluation shows a 1" oil dump valve with 1/2" trim is currently installed onsite.

ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 24) is checked "yes" indicating the oil dump trim onsite is consistent with the Engineering Evaluation, and is therefore 1/2". There is no indication the oil dump valve onsite was changed from a 2" valve to a 1" valve.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GIES T6N-R65W-S5 L01**

Consent Decree Tank System Number: **747**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GIES T6N-R65W-S5 L01_FINAL PACKET	.pdf	6/9/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GIES T6N-R65W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	9/26/2017	STEM Engineering Evaluation Spreadsheet
GIES T6N-R65W-S5 L01_SIGNED EVAL	.pdf	10/3/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GIES T6N-R65W-S5 L01_FINAL PACKET	.pdf	6/9/2017	Work Request
GIES T6N-R65W-S5 L01_FINAL PACKET	.pdf	6/9/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GIES T6N-R65W-S5 L01_WALKDOWN	.pdf	6/9/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GIES T6N-R65W-S5 L01_IR VERIFICATION	.pdf	4/27/2018	IR Verification Field Data Sheet
GIES T6N-R65W-S5 L01_2099_NORMAL	.mp4	6/2/2017	IR Camera Video Normal Operations
GIES T6N-R65W-S5 L01_2100_DUMP	.mp4	6/2/2017	IR Camera Video During Dump Event
GIES T6N-R65W-S5 L01_2101_POST	.mp4	6/2/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GIES T6N-R65W-S5 L01_SIGNED EVAL	.pdf	10/3/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GIES T6N-R65W-S5 L01**

**Consent Decree Tank System Number:** **747**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>189</b>	<b>189</b>	
Total VCS Capacity (scfh)	<b>4,216</b>	<b>5,147</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,148</b>	<b>2,078</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell

Audit Document Review Date: 6/27/2018

Audit Document Review Verified by: Chris Boggess

Audit Document Verification Date: 11/15/2018

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GIES T6N-R65W-S5 L01**

Consent Decree Tank System Number: **747**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	694							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	61.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,556	2,556
Oil Tank Working Rate	275	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GIES T6N-R65W-S5 L01**

Consent Decree Tank System Number: **747**

**Audit Notes**

The stem work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 21-25 of the Final Packet) does it confirm this task was completed

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 4/28/2017, field verification confirmed that the 3" VOC line from the tank to the KO pot was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GITTLEIN T3N-R64W-S3 L01**

Consent Decree Tank System Number: **511**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GITTLEIN T3N-R64W-S3 L01_FINAL PACKET	.pdf	6/12/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GITTLEIN T3N-R64W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	5/25/2017	STEM Engineering Evaluation Spreadsheet
GITTLEIN T3N-R64W-S3 L01_SIGNED EVAL	.pdf	6/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GITTLEIN T3N-R64W-S3 L01_FINAL PACKET	.pdf	7/29/2015	Work Request
GITTLEIN T3N-R64W-S3 L01_FINAL PACKET	.pdf	2/3/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GITTLEIN T3N-R64W-S3 L01_FINAL PACKET	.pdf	2/24/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GITTLEIN T3N-R64W-S3 L01_FINAL PACKET	.pdf	2/24/2016	IR Verification Field Data Sheet
GITTLEIN T3N-R64W-S3 L01_0726_NORMAL	.mp4	2/24/2016	IR Camera Video Normal Operations
GITTLEIN T3N-R64W-S3 L01_0727_DUMP	.mp4	2/24/2016	IR Camera Video During Dump Event
GITTLEIN T3N-R64W-S3 L01_0728_POST	.mp4	2/24/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GITTLEIN T3N-R64W-S3 L01_SIGNED EVAL	.pdf	6/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** GITTLEIN T3N-R64W-S3 L01

**Consent Decree Tank System Number:** 511

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	TEC 4-CS (48" Tornado)			
Number of Units	1			
Man. Capacity (MSCFD)	110.4			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,508	4,509	0%
Calculated Burner Capacity (scfh)	4,181	4,600	
Headspace Surge Capacity (scfh)	2,394	2,394	
Total VCS Capacity (scfh)	6,575	6,994	
VCS Capacity minus PPIVF (scfh)	2,067	2,485	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 11/6/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/20/2017





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GITTLEIN T3N-R64W-S3 L01**

Consent Decree Tank System Number: **511**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (k)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (k)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GITTLEIN T3N-R64W-S3 L01**

Consent Decree Tank System Number: **511**

**Audit Notes**

The Field Datasheet (GITTLEIN T3N-R64W-S3 L01\_FINAL PACKET, p 11) did not specify a date but the information makes sense based on the other documentation. Assuming that the Field Datasheet was completed prior to any changes on site.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01**

Consent Decree Tank System Number: **536**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_FINAL PACKET	pdf	9/18/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_SIGNED EVAL	pdf	6/26/2017	Final Signed Engineering Evaluation
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_STEM Engineering Evaluation_rev1	xlsm	6/26/2017	STEM Engineering Evaluation Spreadsheet

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_FINAL PACKET	pdf	9/18/2017	Work Request
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_FINAL PACKET	pdf	9/18/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_WALKDOWN.pdf	pdf	9/6/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_1474_NORMAL	mp4	9/6/2016	IR Camera Video Normal Operations
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_1475_DUMP	mp4	9/6/2016	IR Camera Video During Dump Event
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_1476_POST	mp4	9/6/2016	IR Camera Video Post Dump Event
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_IR VERIFICATION	pdf	9/6/2016	IR Verification Field Data Sheet

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01_SIGNED EVAL	pdf	6/26/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01

**Consent Decree Tank System Number:** 536

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,273</b>	<b>7,274</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>22,704</b>	<b>4,283</b>	
Total VCS Capacity (scfh)	<b>26,759</b>	<b>8,883</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,486</b>	<b>1,609</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 11/7/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 11/30/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01**

Consent Decree Tank System Number: **536**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,274</b>	<b>7,273</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GITTLEIN UPRC ART RED FRONT RANGE T3N-R64W-S9 L01**

Consent Decree Tank System Number: **536**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 21-26) are not dated. Assumed the date is the same as Facility Scouting date (3/3/16).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOETZ T2N-R64W-S22 L01**

Consent Decree Tank System Number: **870**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GOETZ T2N-R64W-S22 L01_FINAL PACKET	.pdf	1/16/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GOETZ T2N-R64W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	1/16/2017	STEM Engineering Evaluation Spreadsheet
GOETZ T2N-R64W-S22 L01_SIGNED EVAL	.pdf	1/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GOETZ T2N-R64W-S22 L01_FINAL PACKET	.pdf	1/16/2017	Work Request
GOETZ T2N-R64W-S22 L01_FINAL PACKET	.pdf	1/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GOETZ T2N-R64W-S22 L01_WALKDOWN	.pdf	1/16/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GOETZ T2N-R64W-S22 L01_IR VERIFICATION	.pdf	4/27/2108	IR Verification Field Data Sheet
GOETZ T2N-R64W-S22 L01_0019_NORMAL	.mp4	1/12/2017	IR Camera Video Normal Operations
GOETZ T2N-R64W-S22 L01_0020_DUMP	.mp4	1/12/2017	IR Camera Video During Dump Event
GOETZ T2N-R64W-S22 L01_0021_POST	.mp4	1/12/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GOETZ T2N-R64W-S22 L01_SIGNED EVAL	.pdf	1/16/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GOETZ T2N-R64W-S22 L01**

**Consent Decree Tank System Number:** **870**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,451</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>6,256</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>6,256</b>	<b>10,386</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,985</b>	<b>5,935</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/3/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/12/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOETZ T2N-R64W-S22 L01**

Consent Decree Tank System Number: **870**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,451</b>	<b>4,271</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOETZ T2N-R64W-S22 L01**

Consent Decree Tank System Number: **870**

**Audit Notes**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used in the NEI evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLD T5N-R66W-S2 L01**

Consent Decree Tank System Number: **748**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GOLD T5N-R66W-S2 L01_FINAL PACKET	.pdf	2/7/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GOLD T5N-R66W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	8/8/2016	STEM Engineering Evaluation Spreadsheet
GOLD T5N-R66W-S2 L01_SIGNED EVAL	.pdf	8/16/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GOLD T5N-R66W-S2 L01_FINAL PACKET	.pdf	2/7/2018	Work Request
GOLD T5N-R66W-S2 L01_FINAL PACKET	.pdf	2/7/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GOLD T5N-R66W-S2 L01_FINAL PACKET	.pdf	2/7/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GOLD T5N-R66W-S2 L01_IR VERIFICATION	.pdf	7/20/2016	IR Verification Field Data Sheet
GOLD T5N-R66W-S2 L01_1291_NORMAL	.mp4	7/18/2016	IR Camera Video Normal Operations
GOLD T5N-R66W-S2 L01_1292_DUMP	.mp4	7/18/2016	IR Camera Video During Dump Event
GOLD T5N-R66W-S2 L01_1293_POST	.mp4	7/18/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GOLD T5N-R66W-S2 L01_SIGNED EVAL	.pdf	8/16/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLD T5N-R66W-S2 L01**

Consent Decree Tank System Number: **748**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,436</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,969</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>122</b>	<b>122</b>	
Total VCS Capacity (scfh)	<b>3,091</b>	<b>5,955</b>	
VCS Capacity minus PPIVF (scfh)	<b>655</b>	<b>3,519</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 2/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/30/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLD T5N-R66W-S2 L01**

Consent Decree Tank System Number: **748**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>431</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>48.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,027</b>	<b>2,027</b>
Oil Tank Working Rate	<b>171</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,436</b>	<b>2,436</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLD T5N-R66W-S2 L01**

Consent Decree Tank System Number: **748**

**Audit Notes**

The stem work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 35-43 of the Final Packet) does it confirm this task was completed

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 6/22/2016, field verification confirmed that the 3" VOC line from the tank to the KO pot was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLDBERG T5N-R67W-S24 L01**

Consent Decree Tank System Number: **1271**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GOLDBERG T5N-R67W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GOLDBERG T5N-R67W-S24 L01_STEM Engineering Evaluation_rev1	.xls	7/11/2018	STEM Engineering Evaluation Spreadsheet
GOLDBERG T5N-R67W-S24 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GOLDBERG T5N-R67W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
GOLDBERG T5N-R67W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GOLDBERG T5N-R67W-S24 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GOLDBERG T5N-R67W-S24 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
GOLDBERG T5N-R67W-S24 L01_0008_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
GOLDBERG T5N-R67W-S24 L01_0009_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
GOLDBERG T5N-R67W-S24 L01_0010_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GOLDBERG T5N-R67W-S24 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLDBERG T5N-R67W-S24 L01**

Consent Decree Tank System Number: **1271**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>539</b>	<b>539</b>	
Total VCS Capacity (scfh)	<b>4,566</b>	<b>5,497</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,122</b>	<b>2,053</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLDBERG T5N-R67W-S24 L01**

Consent Decree Tank System Number: **1271**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLDBERG T5N-R67W-S24 L01**

Consent Decree Tank System Number: **1271**

**Audit Notes**

The work request (FINAL PACKET p. 3) states that the VOC line from the tank to the KO needs to be changed from 2" to 3". There is no verification that this was completed (FINAL PACKET p.4-32).

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 7/28/2017, field verification confirmed that the 3" VOC line from the tank to the KO pot was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GOLLNER T4N-R67W-S27 L02**

**Consent Decree Tank System Number:** **1093**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GOLLNER T4N-R67W-S27 L02_FINAL PACKET	.pdf	8/27/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GOLLNER T4N-R67W-S27 L02_STEM Engineering Evaluation_rev1	.xlsm	8/27/2018	STEM Engineering Evaluation Spreadsheet
GOLLNER T4N-R67W-S27 L02_SIGNED EVAL	.pdf	8/27/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GOLLNER T4N-R67W-S27 L02_FINAL PACKET	.pdf	8/27/2018	Work Request
GOLLNER T4N-R67W-S27 L02_FINAL PACKET	.pdf	8/27/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GOLLNER T4N-R67W-S27 L02_WALKDOWN	.pdf	8/27/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GOLLNER T4N-R67W-S27 L02_IR VERIFICATION	.pdf	8/27/2018	IR Verification Field Data Sheet
GOLLNER T4N-R67W-S27 L02_0187_NORMAL	.mp4	8/27/2018	IR Camera Video Normal Operations
GOLLNER T4N-R67W-S27 L02_0188_DUMP	.mp4	8/27/2018	IR Camera Video During Dump Event
GOLLNER T4N-R67W-S27 L02_0189_POST	.mp4	8/27/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GOLLNER T4N-R67W-S27 L02_SIGNED EVAL	.pdf	8/27/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLLNER T4N-R67W-S27 L02**

Consent Decree Tank System Number: **1093**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,147</b>	<b>3,148</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,123</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>44</b>	<b>44</b>	
Total VCS Capacity (scfh)	<b>4,167</b>	<b>4,644</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,020</b>	<b>1,496</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 8/28/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLLNER T4N-R67W-S27 L02**

Consent Decree Tank System Number: **1093**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	694							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	61.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	400	0
scfh vapor/tank <sup>i</sup>	317	0
Mscfd	8	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,556	2,556
Oil Tank Working Rate	275	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	317	317
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,148</b>	<b>3,147</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GOLLNER T4N-R67W-S27 L02**

Consent Decree Tank System Number: **1093**

### Audit Notes

The stem work request form (PG 3 of Final Packet pdf) states for the pneumatic pshh to set the hp hi/lo no higher than 55 psig however nowhere in the job sheets (PGs 19-23) does it confirm this task was completed. Noble provided a response to the above discrepancy on 11/14/2018 that states "Automation verification for this facility was completed on or around 11/12/2018, automation verification confirmed that the PSHH setting on the LP Separators was set at no higher than 55 psig."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRAVEL DRAW T8N-R61W-S9 L01**

Consent Decree Tank System Number: **1968**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S9 L01_FINAL PACKET	.pdf	8/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	9/21/2017	STEM Engineering Evaluation Spreadsheet
GRAVEL DRAW T8N-R61W-S9 L01_SIGNED EVAL	.pdf	9/25/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S9 L01_FINAL PACKET	.pdf	8/10/2017	Work Request
GRAVEL DRAW T8N-R61W-S9 L01_FINAL PACKET	.pdf	8/10/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S9 L01_WALKDOWN	.pdf	8/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S9 L01_IR VERIFICATION	.pdf	3/19/2018	IR Verification Field Data Sheet
GRAVEL DRAW T8N-R61W-S9 L01_2256_NORMAL	.mp4	8/9/2017	IR Camera Video Normal Operations
GRAVEL DRAW T8N-R61W-S9 L01_2257_DUMP	.mp4	8/9/2017	IR Camera Video During Dump Event
GRAVEL DRAW T8N-R61W-S9 L01_2258_POST	.mp4	8/9/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S9 L01_SIGNED EVAL	.pdf	9/25/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GRAVEL DRAW T8N-R61W-S9 L01**

**Consent Decree Tank System Number:** **1968**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>400</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>185,797</b>	<b>212,959</b>	<b>15%</b>
Calculated Burner Capacity (scfh)	<b>3,926</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>421,438</b>	<b>421,438</b>	
Total VCS Capacity (scfh)	<b>425,364</b>	<b>426,396</b>	
VCS Capacity minus PPIVF (scfh)	<b>239,567</b>	<b>213,438</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury

Audit Document Review Date: 7/9/2018

Audit Document Review Verified by: Chris Boggess

Audit Document Verification Date: 11/15/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRAVEL DRAW T8N-R61W-S9 L01**

Consent Decree Tank System Number: **1968**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50							
Z2	-0.86							
Z3	0.98							
Z	1.61							
Gas/Oil Ratio (scf/bbl)	256.2							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.76							
Valve Coefficient (gpm/psi) ( $C_v$ )	107.00							
Critical Pressure (psia) <sup>b</sup>	601							
Vapor Pressure (psia) <sup>c</sup>	153							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.82							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	17908							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	4587.8							
Working Flow (Mscfd) <sup>h,i</sup>	170							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.76							
Valve Coefficient (gpm/psi) ( $C_v$ )	107.00							
Critical Pressure (psia) <sup>j</sup>	3200							
Vapor Pressure (psia) <sup>k</sup>	1							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bwpd) <sup>f,g</sup>	34328							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	137							
Working Flow (Mscfd) <sup>l</sup>	193							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	400	400
scfh vapor/tank <sup>i</sup>	317	317
Mscfd	15	8

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	191,159	166,684
Oil Tank Working Rate	7,096	6,172
Water Tank Flash Rate	5,721	4,988
Water Tank Working Rate	8,031	7,002
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>212,959</b>	<b>185,797</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRAVEL DRAW T8N-R61W-S9 L01**

Consent Decree Tank System Number: **1968**

**Audit Notes**

The signed evaluation states that the PSHH should be set to 140 psig, however there is no verification that this work was completed (FINAL PACKET p. 4-29).

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 7), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 140 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRAVEL DRAW T8N-R61W-S30 L01\_WALKDOWN**

Consent Decree Tank System Number: **1969**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S30 L01_FINAL PACKET	.pdf	9/25/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	9/29/2017	STEM Engineering Evaluation Spreadsheet
GRAVEL DRAW T8N-R61W-S30 L01_SIGNED EVAL	.pdf	10/12/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S30 L01_FINAL PACKET	.pdf	9/25/2017	9/25/2017
GRAVEL DRAW T8N-R61W-S30 L01_FINAL PACKET	.pdf		Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S30 L01_WALKDOWN	.pdf	9/25/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S30 L01_IR VERIFICATION	.pdf	3/19/2018	IR Verification Field Data Sheet
GRAVEL DRAW T8N-R61W-S30 L01_4750_NORMAL	.mp4	9/13/2017	IR Camera Video Normal Operations
GRAVEL DRAW T8N-R61W-S30 L01_4751_DUMP	.mp4	9/13/2017	IR Camera Video During Dump Event
GRAVEL DRAW T8N-R61W-S30 L01_4752_POST	.mp4	9/13/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
GRAVEL DRAW T8N-R61W-S30 L01_SIGNED EVAL	.pdf	10/12/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GRAVEL DRAW T8N-R61W-S30 L01\_WALKDOWN**

**Consent Decree Tank System Number:** **1969**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>400</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>185</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 1" (ro)</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>185</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; a*</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>70,854</b>	<b>69,735</b>	<b>-2%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>129,321</b>	<b>129,321</b>	
Total VCS Capacity (scfh)	<b>133,410</b>	<b>133,921</b>	
VCS Capacity minus PPIVF (scfh)	<b>62,556</b>	<b>64,186</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/7/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRAVEL DRAW T8N-R61W-S30 L01\_WALKDOWN**

Consent Decree Tank System Number: **1969**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.88</b>							
Gas/Oil Ratio (scf/bbl)	<b>376.7</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_r$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>17.60</b>							
Critical Pressure (psia) <sup>b</sup>	<b>642</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>198</b>							
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	<b>0.80</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1294.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>33</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_r$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>93.30</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>33639</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>135</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>189</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>400</b>
scfh vapor/tank <sup>l</sup>	<b>317</b>	<b>317</b>
Mscfd	<b>15</b>	<b>8</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>53,946</b>	<b>54,866</b>
Oil Tank Working Rate	<b>1,362</b>	<b>1,382</b>
Water Tank Flash Rate	<b>5,606</b>	<b>5,681</b>
Water Tank Working Rate	<b>7,870</b>	<b>7,974</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>69,735</b>	<b>70,854</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRAVEL DRAW T8N-R61W-S30 L01\_WALKDOWN**

Consent Decree Tank System Number: **1969**

**Audit Notes**

The walkdown checklist (GRAVEL DRAW T8N-R61W-S30 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documents in the final packet (GRAVEL DRAW T8N-R61W-S30 L01\_FINAL PACKET).

Documentation indicates that a 1" flow orifice is used in combination with a valve to restrict oil flow from the LP separator. NEI provided a summary of their derivation of combined flow valve-orifice flow characteristics. SLR used Cf and Cv as provided by NEI.

The separator pneumatic PSHH is set by the operator, not automation, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 185 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GREEN USX EE T7N-R65W-S13 L02**

Consent Decree Tank System Number: **1602**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GREEN USX EE T7N-R65W-S13 L02_FINAL PACKET	pdf	5/3/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GREEN USX EE T7N-R65W-S13 L02_STEM Engineering Evaluation_rev1	xlsm	5/20/2016	STEM Engineering Evaluation Spreadsheet
GREEN USX EE T7N-R65W-S13 L02_SIGNED EVAL	pdf	5/20/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GREEN USX EE T7N-R65W-S13 L02_FINAL PACKET	pdf	5/3/2016	Work Request
GREEN USX EE T7N-R65W-S13 L02_FINAL PACKET	pdf	5/3/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GREEN USX EE T7N-R65W-S13 L02_WALKDOWN	pdf	11/16/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GREEN USX EE T7N-R65W-S13 L02_0931_POST	mp4	5/2/2016	IR Camera Video Normal Operations
GREEN USX EE T7N-R65W-S13 L02_0929_NORMAL	mp4	5/2/2016	IR Camera Video During Dump Event
GREEN USX EE T7N-R65W-S13 L02_0930_DUMP	mp4	5/2/2016	IR Camera Video Post Dump Event
GREEN USX EE T7N-R65W-S13 L02_IR VERIFICATION	pdf	5/2/2016	IR Verification Field Data Sheet

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GREEN USX EE T7N-R65W-S13 L02_SIGNED EVAL	pdf	5/20/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GREEN USX EE T7N-R65W-S13 L02**

Consent Decree Tank System Number: **1602**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,824</b>	<b>3,825</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,971</b>	<b>2,971</b>	
Total VCS Capacity (scfh)	<b>5,697</b>	<b>8,804</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,873</b>	<b>4,979</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 11/7/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 11/30/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GREEN USX EE T7N-R65W-S13 L02**

Consent Decree Tank System Number: **1602**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>3,049</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,824</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GREEN USX EE T7N-R65W-S13 L02**

Consent Decree Tank System Number: **1602**

**Audit Notes**

**1. PPIVFR overestimated**

The Job Sheet (Final Packet pg 22) indicates a 1" valve size was installed onsite. The STEM Engineering Evaluation provided shows a 2" valve was used in the evaluation. Using a 2" valve onsite results in an overestimated PPIVFR and therefore the Modeling Guideline is being met and exceeded.

**2. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 12-17) are not dated. Assumed the date is the same as Facility Scouting date (4/18/16).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRIGSBY PC T7N-R63W-S30 L01**

Consent Decree Tank System Number: **595**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GRIGSBY PC T7N-R63W-S30 L01_FINAL PACKET	.pdf	1/4/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GRIGSBY PC T7N-R63W-S30 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	10/27/2017	STEM Engineering Evaluation Spreadsheet
GRIGSBY PC T7N-R63W-S30 L01_SIGNED EVAL REVISED	.pdf	11/8/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GRIGSBY PC T7N-R63W-S30 L01_FINAL PACKET	.pdf	1/4/2016	Work Request
GRIGSBY PC T7N-R63W-S30 L01_FINAL PACKET	.pdf	1/4/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GRIGSBY PC T7N-R63W-S30 L01_WALKDOWN	.pdf	1/4/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GRIGSBY PC T7N-R63W-S30 L01_IR VERIFICATION	.pdf	12/31/2015	IR Verification Field Data Sheet
GRIGSBY PC T7N-R63W-S30 L01_0064_NORMAL	.mp4	12/28/2015	IR Camera Video Normal Operations
GRIGSBY PC T7N-R63W-S30 L01_0065_DUMP	.mp4	12/28/2015	IR Camera Video During Dump Event
GRIGSBY PC T7N-R63W-S30 L01_0066_POST	.mp4	12/28/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GRIGSBY PC T7N-R63W-S30 L01_SIGNED EVAL REVISED	.pdf	11/8/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRIGSBY PC T7N-R63W-S30 L01**

Consent Decree Tank System Number: **595**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>28,498</b>	<b>28,503</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,285</b>	<b>9,106</b>	
Headspace Surge Capacity (scfh)	<b>87,499</b>	<b>87,499</b>	
Total VCS Capacity (scfh)	<b>93,784</b>	<b>96,605</b>	
VCS Capacity minus PPIVF (scfh)	<b>65,286</b>	<b>68,102</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Rachel Acker  
 Audit Document Review Date: \_\_\_\_\_ 3/30/2018  
 Audit Document Review Verified by: \_\_\_\_\_ Chris Driscoll  
 Audit Document Verification Date: \_\_\_\_\_ 4/16/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRIGSBY PC T7N-R63W-S30 L01**

Consent Decree Tank System Number: **595**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2409	2409						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7						
Working Flow (Mscfd) <sup>h,i</sup>	23	23						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	34	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	22,641	22,641
Oil Tank Working Rate	1,909	1,904
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	2,527	2,527
Total	28,503	28,498

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GRIGSBY PC T7N-R63W-S30 L01**

Consent Decree Tank System Number: **595**

**Audit Notes**

N/A

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GULLEY AMIGO T6N-R64W-S17 L01**

Consent Decree Tank System Number: **604**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
GULLEY AMIGO T6N-R64W-S17 L01_FINAL PACKET	.pdf	10/30/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
GULLEY AMIGO T6N-R64W-S17 L01_STEM Engineering Evaluation_rev1	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
GULLEY AMIGO T6N-R64W-S17 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
GULLEY AMIGO T6N-R64W-S17 L01_FINAL PACKET	.pdf	10/30/2015	Work Request
GULLEY AMIGO T6N-R64W-S17 L01_FINAL PACKET	.pdf	10/30/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
GULLEY AMIGO T6N-R64W-S17 L01_WALKDOWN	.pdf	10/26/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
GULLEY AMIGO T6N-R64W-S17 L01_IR VERIFICATION	.pdf	10/26/2015	IR Verification Field Data Sheet
GULLEY AMIGO T6N-R64W-S17 L01_0377_NORMAL	.mp4	10/26/2015	IR Camera Video Normal Operations
GULLEY AMIGO T6N-R64W-S17 L01_0378_DUMP	.mp4	10/26/2015	IR Camera Video During Dump Event
GULLEY AMIGO T6N-R64W-S17 L01_0379_POST	.mp4	10/26/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
GULLEY AMIGO T6N-R64W-S17 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GULLEY AMIGO T6N-R64W-S17 L01**

**Consent Decree Tank System Number:** **604**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,787</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>2,089</b>	<b>2,089</b>	
Total VCS Capacity (scfh)	<b>5,876</b>	<b>6,642</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,368</b>	<b>2,133</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/5/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/15/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GULLEY AMIGO T6N-R64W-S17 L01**

Consent Decree Tank System Number: **604**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GULLEY AMIGO T6N-R64W-S17 L01**

Consent Decree Tank System Number: **604**

**Audit Notes**

No notes, all site documentation is consistent with Modeling Guideline, Engineering Design Standard, and itself.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GULLICKSON ROWE JR T4N-R65W-S21 L01**

Consent Decree Tank System Number: **2258**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GULLICKSON ROWE JR T4N-R65W-S21 L01_FINAL PACKET	.pdf	8/11/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GULLICKSON ROWE JR T4N-R65W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	8/21/2017	STEM Engineering Evaluation Spreadsheet
GULLICKSON ROWE JR T4N-R65W-S21 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GULLICKSON ROWE JR T4N-R65W-S21 L01_FINAL PACKET	.pdf	8/11/2017	Work Request
GULLICKSON ROWE JR T4N-R65W-S21 L01_FINAL PACKET	.pdf	8/11/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GULLICKSON ROWE JR T4N-R65W-S21 L01_FINAL PACKET	.pdf	8/11/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GULLICKSON ROWE JR T4N-R65W-S21 L01_IR VERIFICATION	.pdf	8/11/2017	IR Verification Field Data Sheet
GULLICKSON ROWE JR T4N-R65W-S21 L01_2275_NORMAL	.mp4	8/10/2017	IR Camera Video Normal Operations
GULLICKSON ROWE JR T4N-R65W-S21 L01_2276_DUMP	.mp4	8/10/2017	IR Camera Video During Dump Event
GULLICKSON ROWE JR T4N-R65W-S21 L01_2277_POST	.mp4	8/10/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GULLICKSON ROWE JR T4N-R65W-S21 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GULLICKSON ROWE JR T4N-R65W-S21 L01**

**Consent Decree Tank System Number:** **2258**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,957</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,493</b>	<b>2,493</b>	
Total VCS Capacity (scfh)	<b>5,450</b>	<b>8,326</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,145</b>	<b>5,020</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 2/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 6/5/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GULLICKSON ROWE JR T4N-R65W-S21 L01**

Consent Decree Tank System Number: **2258**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

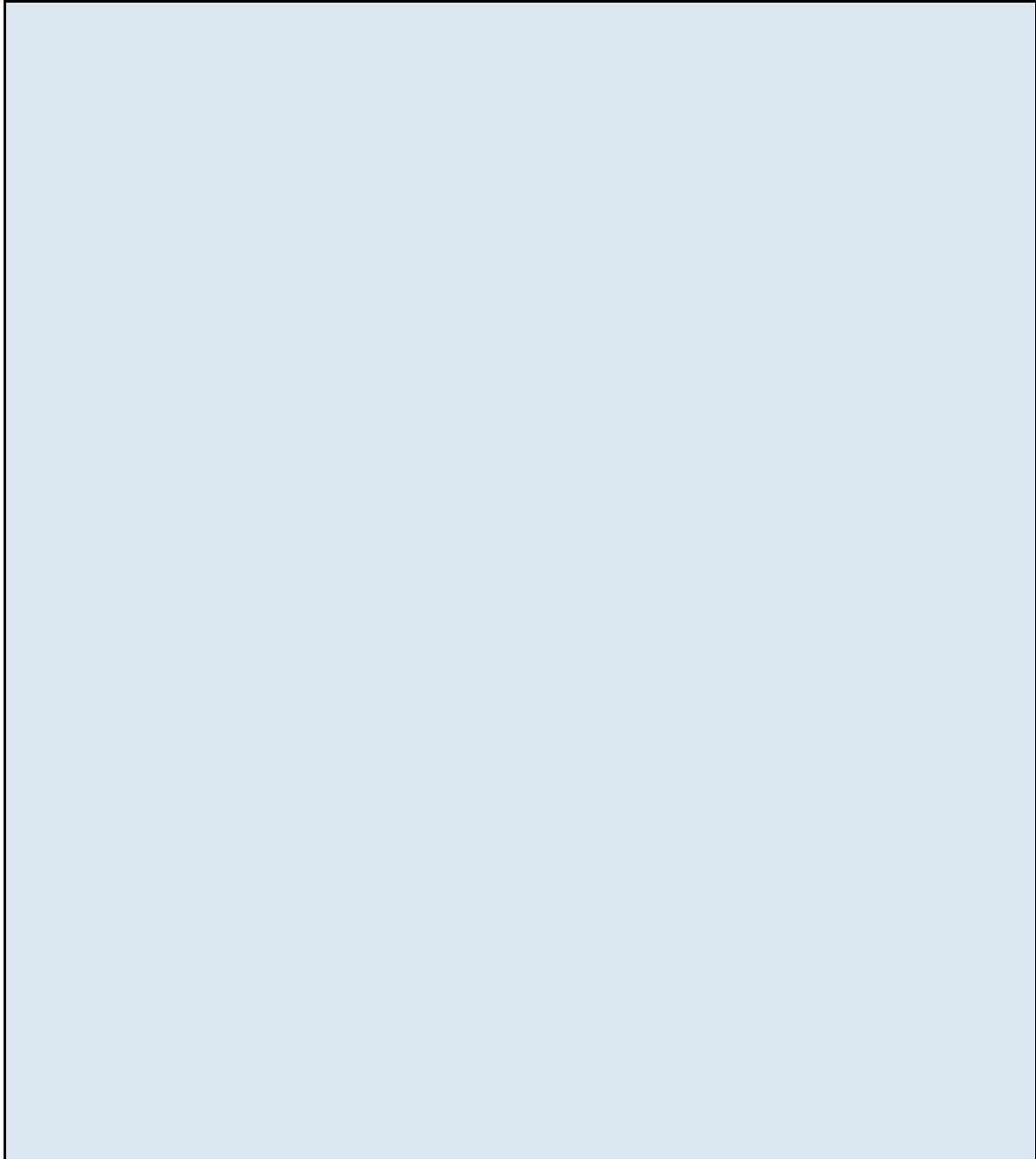
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GULLICKSON ROWE JR T4N-R65W-S21 L01**

Consent Decree Tank System Number: **2258**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GURTLER T3N-R65W-S24 L02**

Consent Decree Tank System Number: **429/1885**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_FINAL PACKET	.pdf	3/9/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_SIGNED EVAL	.pdf	2/1/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_FINAL PACKET	.pdf	3/9/2017	Work Request
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_FINAL PACKET	.pdf	3/9/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_WALKDOWN	.pdf	3/8/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_IR VERIFICATION	.pdf	3/8/2017	IR Verification Field Data Sheet
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_1849_NORMAL	.mp4	3/8/2017	IR Camera Video Normal Operations
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_1850_DUMP	.mp4	3/8/2017	IR Camera Video During Dump Event
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_1851_POST	.mp4	3/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GURTLER T3N-R65W-S24 L02 & GURTLER T3N-R65W-S24 L05_SIGNED EVAL	.pdf	2/1/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GURTLER T3N-R65W-S24 L02**

**Consent Decree Tank System Number:** **429/1885**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,925</b>	<b>4,926</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,945</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>23,770</b>	<b>3,425</b>	
Total VCS Capacity (scfh)	<b>26,715</b>	<b>9,258</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,790</b>	<b>4,332</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/19/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GURTLER T3N-R65W-S24 L02**

Consent Decree Tank System Number: **429/1885**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,885</b>	<b>3,885</b>
Oil Tank Working Rate	<b>328</b>	<b>327</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,925</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GURTLER T3N-R65W-S24 L02**

Consent Decree Tank System Number: **429/1885**

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank and leave connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

Noble provided information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 10/4/2016, field verification confirmed that one tank was converted to a headspace tank." The Engineering Design Standard has been appropriately applied based on the provided field verification information.

The NEI Engineer Evaluation was completed with 3" NPS for the Tanks to KO VCS piping, 4" NPS for the KO to Burner VCS piping, and 2" NPS for the Main Header to Burner Inlet VCS piping. Field Datasheets indicate the Tank to KO VCS piping is 2" NPS, KO to Burner VCS piping is 2" NPS BGL (modified to 4" AGL), and the Main Header to Burner Inlet VCS piping is 3" NPS. There is no confirmation that the modification to the Tanks to KO VCS piping was modified to 3".

Noble provided information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 10/4/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed." The Engineering Design Standard was appropriately applied based on the provided field verification information.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUSTAFSON T6N-R65W-S4 L01**

Consent Decree Tank System Number: **1097**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GUSTAFSON T6N-R65W-S4 L01_FINAL PACKET	.pdf	2/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GUSTAFSON T6N-R65W-S4 L01_STEM Engineering Evaluation_rev1	.xlsm	3/15/2016	STEM Engineering Evaluation Spreadsheet
GUSTAFSON T6N-R65W-S4 L01_SIGNED EVAL	.pdf	3/16/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GUSTAFSON T6N-R65W-S4 L01_FINAL PACKET	.pdf	2/29/2016	Work Request
GUSTAFSON T6N-R65W-S4 L01_FINAL PACKET	.pdf	2/29/2016	Construction Jobsheets
223_GUSTAFSON T6N-R65W-S4 L01_REWORK	.pdf	11/14/2018	Rework Request

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GUSTAFSON T6N-R65W-S4 L01_WALKDOWN	.pdf	2/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GUSTAFSON T6N-R65W-S4 L01_IR VERIFICATION	.pdf	2/26/2016	IR Verification Field Data Sheet
GUSTAFSON T6N-R65W-S4 L01_0100_NORMAL	.mp4	2/25/2016	IR Camera Video Normal Operations
GUSTAFSON T6N-R65W-S4 L01_0101_DUMP	.mp4	2/25/2016	IR Camera Video During Dump Event
GUSTAFSON T6N-R65W-S4 L01_0102_POST	.mp4	2/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GUSTAFSON T6N-R65W-S4 L01_SIGNED EVAL	.pdf	3/16/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GUSTAFSON T6N-R65W-S4 L01**

**Consent Decree Tank System Number:** **1097**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,812</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>767</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,579</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>511</b>	<b>2,639</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/11/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/29/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUSTAFSON T6N-R65W-S4 L01**

Consent Decree Tank System Number: **1097**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUSTAFSON T6N-R65W-S4 L01**

Consent Decree Tank System Number: **1097**

**Audit Notes**

The walkdown checklist (GUSTAFSON T6N-R65W-S4 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (GUSTAFSON T6N-R65W-S4 L01\_FINAL PACKET) where applicable.

The work request form (GUSTAFSON T6N-R65W-S4 L01\_FINAL PACKET, p 3) requests a new 300 LP gas header be installed. The job sheet (GUSTAFSON T6N-R65W-S4 L01\_FINAL PACKET, p 23) confirms a new 300 LP separator was installed with a 1/2" trim. There was no mention of the valve size, so a 2" valve was used in the model to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

The work request (GUSTAFSON T6N-R65W-S4 L01\_FINAL PACKET, p 14) states that the PSHH on the LP separator was to be set at 70 psig. An email on 1/26/2016 (GUSTAFSON T6N-R65W-S4 L01\_FINAL PACKET, p 27) confirms the operating pressure was set to 70 psig. A stem rework request dated 3/3/2016 (GUSTAFSON T6N-R65W-S4 L01\_REWORK) requests the PSHH be set to 55 psig. The signed evaluation from 3/16/2016 (GUSTAFSON T6N-R65W-S4 L01\_SIGNED EVAL) lists the maximum operating pressure back as 55 psig. There was no confirmation the rework was completed to reduce the maximum operating pressure of the LP separator from 70 psig to 55 psig. Noble provided additional data on 11/14/2018 stating that "Rework was completed on or around 3/15/2016, which decreased the LP separator pressure to no higher than 55 psig. Automation verification for this facility was completed on or around 3/15/2016, automation verification confirmed that the PSHH setting on the LP Separator was set at no higher than 55 psig."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ART RED GUTTERSEN T3N-R64W-S9 L01**

Consent Decree Tank System Number: **534/537**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_FINAL PACKET	.pdf	8/29/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_STEM Engineering	.xlsm	8/30/2017	STEM Engineering Evaluation Spreadsheet
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_SIGNED EVAL	.pdf	9/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_FINAL PACKET	.pdf	8/29/2017	Work Request
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_FINAL PACKET	.pdf	8/29/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_WALKDOWN	.pdf	8/25/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_IR VERIFICATION	.pdf	8/25/2017	IR Verification Field Data Sheet
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_4702_NORMAL	.mp4	8/25/2017	IR Camera Video Normal Operations
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_4703_DUMP	.mp4	8/25/2017	IR Camera Video During Dump Event
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_4704_POST	.mp4	8/25/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ART RED T3N-R64W-S9 L01 & ART RED GUTTERSEN T3N-R64W-S9 L01_SIGNED EVAL	.pdf	9/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ART RED GUTTERSEN T3N-R64W-S9 L01

**Consent Decree Tank System Number:** 534/537

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,222</b>	<b>2,222</b>	
Total VCS Capacity (scfh)	<b>5,774</b>	<b>6,822</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,093</b>	<b>2,997</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/20/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ART RED GUTTERSEN T3N-R64W-S9 L01**

Consent Decree Tank System Number: **534/537**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ART RED GUTTERSEN T3N-R64W-S9 L01**

Consent Decree Tank System Number: **534/537**

**Audit Notes**

The Work Request indicated the oil dump valves on Separator was to be modified to Kimray 1400 with 1/2 inch trim. Could not verify the oil dump valve size (2" or 1") with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN C T4N-R64W-S33 L01**

Consent Decree Tank System Number: **1946**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
GUTTERSEN C T4N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN C T4N-R64W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
GUTTERSEN C T4N-R64W-S33 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN C T4N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
GUTTERSEN C T4N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN C T4N-R64W-S33 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN C T4N-R64W-S33 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
GUTTERSEN C T4N-R64W-S33 L01_4722_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
GUTTERSEN C T4N-R64W-S33 L01_4723_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
GUTTERSEN C T4N-R64W-S33 L01_4724_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN C T4N-R64W-S33 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN C T4N-R64W-S33 L01**

Consent Decree Tank System Number: **1946**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,662</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,442</b>	<b>21,442</b>	
Total VCS Capacity (scfh)	<b>24,104</b>	<b>27,275</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,596</b>	<b>22,766</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/24/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN C T4N-R64W-S33 L01**

Consent Decree Tank System Number: **1946**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

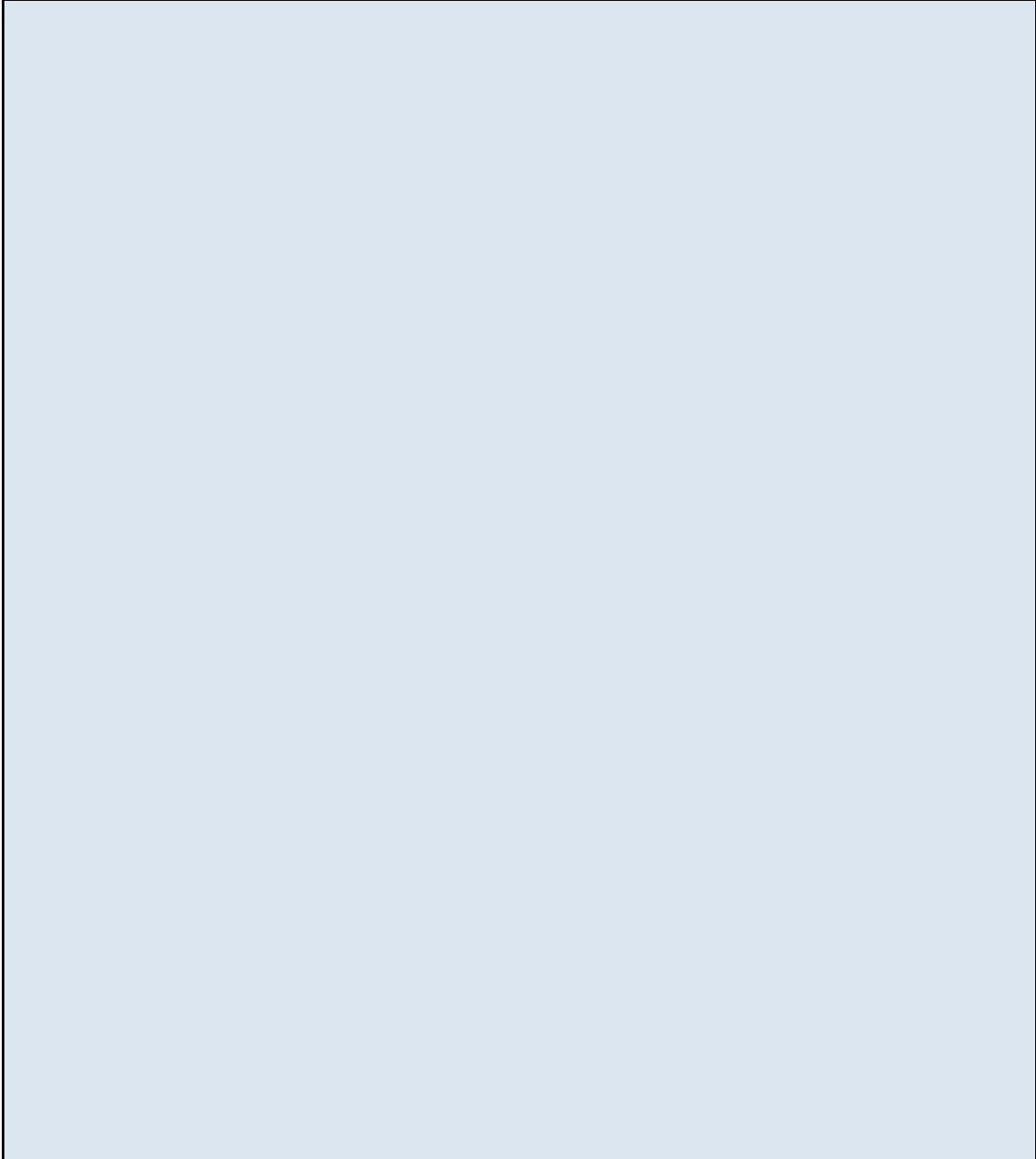
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN C T4N-R64W-S33 L01**

Consent Decree Tank System Number: **1946**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S16 L01**

Consent Decree Tank System Number: **2195**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S16 L01_FINAL PACKET	.pdf	11/8/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S16 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
GUTTERSEN ST T4N-R63W-S16 L01_SIGNED EVAL	.pdf	11/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S16 L01_FINAL PACKET	.pdf	11/8/2017	Work Request
GUTTERSEN ST T4N-R63W-S16 L01_FINAL PACKET	.pdf	11/8/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S16 L01_WALKDOWN	.pdf	11/3/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S16 L01_IR VERIFICATION	.pdf	11/3/2017	IR Verification Field Data Sheet
GUTTERSEN ST T4N-R63W-S16 L01_0021_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
GUTTERSEN ST T4N-R63W-S16 L01_0022_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
GUTTERSEN ST T4N-R63W-S16 L01_0024_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S16 L01_SIGNED EVAL	.pdf	11/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GUTTERSEN ST T4N-R63W-S16 L01**

**Consent Decree Tank System Number:** **2195**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,329</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,058</b>	<b>21,058</b>	
Total VCS Capacity (scfh)	<b>23,387</b>	<b>26,891</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,879</b>	<b>22,203</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 7/20/2018

Audit Document Review Verified by: Patrick Dilsaver

Audit Document Verification Date: 9/19/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S16 L01**

Consent Decree Tank System Number: **2195**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S16 L01**

Consent Decree Tank System Number: **2195**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 21) indicates a new HLP separator was installed onsite and ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 27) is checked "yes" indicating the oil dump trim onsite is consistent with the Engineering Evaluation, and is therefore 1/2". There is no indication provided of the oil dump valve size installed in the HLP separator onsite.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the modeling guideline cannot be confirmed as being followed. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S20 L01**

Consent Decree Tank System Number: **453**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S20 L01_FINAL PACKET	.pdf	11/30/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S20 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	2/7/2018	STEM Engineering Evaluation Spreadsheet
GUTTERSEN ST T4N-R63W-S20 L01_FINAL PACKET	.pdf	11/30/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S20 L01_FINAL PACKET	.pdf	11/30/2017	Work Request
GUTTERSEN ST T4N-R63W-S20 L01_FINAL PACKET	.pdf	11/30/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S20 L01_WALKDOWN	.pdf	12/23/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S20 L01_IR VERIFICATION	.pdf	12/23/2015	IR Verification Field Data Sheet
GUTTERSEN ST T4N-R63W-S20 L01_0542_NORMAL	.mp4	12/22/2015	IR Camera Video Normal Operations
GUTTERSEN ST T4N-R63W-S20 L01_0543_DUMP	.mp4	12/22/2015	IR Camera Video During Dump Event
GUTTERSEN ST T4N-R63W-S20 L01_0544_POST	.mp4	12/22/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S20 L01_FINAL PACKET	.pdf	11/30/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GUTTERSEN ST T4N-R63W-S20 L01**

**Consent Decree Tank System Number:** **453**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>2</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>11,306</b>	<b>11,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>8,304</b>	<b>16,220</b>	
Headspace Surge Capacity (scfh)	<b>20,573</b>	<b>20,573</b>	
Total VCS Capacity (scfh)	<b>28,877</b>	<b>36,793</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,571</b>	<b>25,485</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 4/5/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S20 L01**

Consent Decree Tank System Number: **453**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	2,527	2,527
Total	11,307	11,306

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** GUTTERSEN ST T4N-R63W-S20 L01

**Consent Decree Tank System Number:** 453

**Audit Notes**

The walkdown checklist (GUTTERSEN ST T4N-R63W-S20 L01\_WALKDOWN) was not marked as being complete. Completion was verified with other documentation from the final packet (GUTTERSEN ST T4N-R63W-S20 L01\_FINAL PACKET).

The Signed eval (GUTTERSEN ST T4N-R63W-S20 L01\_SIGNED EVAL) from 11/30/2017 indicates the max separator pressure is 70 psi. An email from 11/9/2015 confirms this pressure (GUTTERSEN ST T4N-R63W-S20 L01\_FINAL PACKET, p 27) . However, another email from 11/11/2015 verifies the pressure switch is set to 60 psi (GUTTERSEN ST T4N-R63W-S20 L01\_FINAL PACKET, p 27). Using a higher pressure will give a higher PPIVFR, therefore is more conservative, so 70 psig was used in the model.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S32 L01**

Consent Decree Tank System Number: **1227**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L01_STEM ENGINEERING EVALUATION_REV1	.xlsm	8/29/2017	STEM Engineering Evaluation Spreadsheet
GUTTERSEN ST T4N-R63W-S32 L01_SIGNED EVAL	.pdf	8/29/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L01_FINAL PACKET	.pdf	8/4/2017	Work Request
GUTTERSEN ST T4N-R63W-S32 L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L01_WALKDOWN	.pdf	7/31/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L01_IR VERIFICATION	.pdf	7/31/2017	IR Verification Field Data Sheet
GUTTERSEN ST T4N-R63W-S32 L01_2186_NORMAL	.mp4	7/31/2017	IR Camera Video Normal Operations
GUTTERSEN ST T4N-R63W-S32 L01_2187_DUMP	.mp4	7/31/2017	IR Camera Video During Dump Event
GUTTERSEN ST T4N-R63W-S32 L01_2188_POST	.mp4	7/31/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L01_SIGNED EVAL	.pdf	8/29/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S32 L01**

Consent Decree Tank System Number: **1227**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,523</b>	<b>3,667</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>697</b>	<b>933</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 6/5/2018  
 Audit Document Review Verified by: \_\_\_\_\_ Patrick Dilsaver  
 Audit Document Verification Date: \_\_\_\_\_ 9/19/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S32 L01**

Consent Decree Tank System Number: **1227**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>317</b>	<b>0</b>
Mscfd	<b>8</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>317</b>	<b>317</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,667</b>	<b>3,523</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S32 L01**

Consent Decree Tank System Number: **1227**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

The Jobsheet (Final Packet, pg 20) indicates a new HLP separator was installed onsite with an unknown oil dump valve size and trim size. ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 26) is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation, and is therefore 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S32 L02**

Consent Decree Tank System Number: **1326**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L02_FINAL PACKET	.pdf	3/30/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L02_STEM Engineering Evaluation_rev1	.xlsm	3/31/2017	STEM Engineering Evaluation Spreadsheet
GUTTERSEN ST T4N-R63W-S32 L02_SIGNED EVAL	.pdf	4/10/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L02_FINAL PACKET	.pdf	3/30/2017	Work Request
GUTTERSEN ST T4N-R63W-S32 L02_FINAL PACKET	.pdf	3/30/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L02_WALKDOWN	.pdf	3/30/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L02_IR VERIFICATION	.pdf	5/3/2018	IR Verification Field Data Sheet
GUTTERSEN ST T4N-R63W-S32 L02_1912_NORMAL	.mp4	3/29/2017	IR Camera Video Normal Operations
GUTTERSEN ST T4N-R63W-S32 L02_1913_DUMP	.mp4	3/29/2017	IR Camera Video During Dump Event
GUTTERSEN ST T4N-R63W-S32 L02_1914_POST	.mp4	3/29/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST T4N-R63W-S32 L02_SIGNED EVAL	.pdf	4/10/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GUTTERSEN ST T4N-R63W-S32 L02**

**Consent Decree Tank System Number:** **1326**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>331</b>	<b>331</b>	
Total VCS Capacity (scfh)	<b>4,099</b>	<b>4,931</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,031</b>	<b>1,862</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/26/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/27/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S32 L02**

Consent Decree Tank System Number: **1326**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

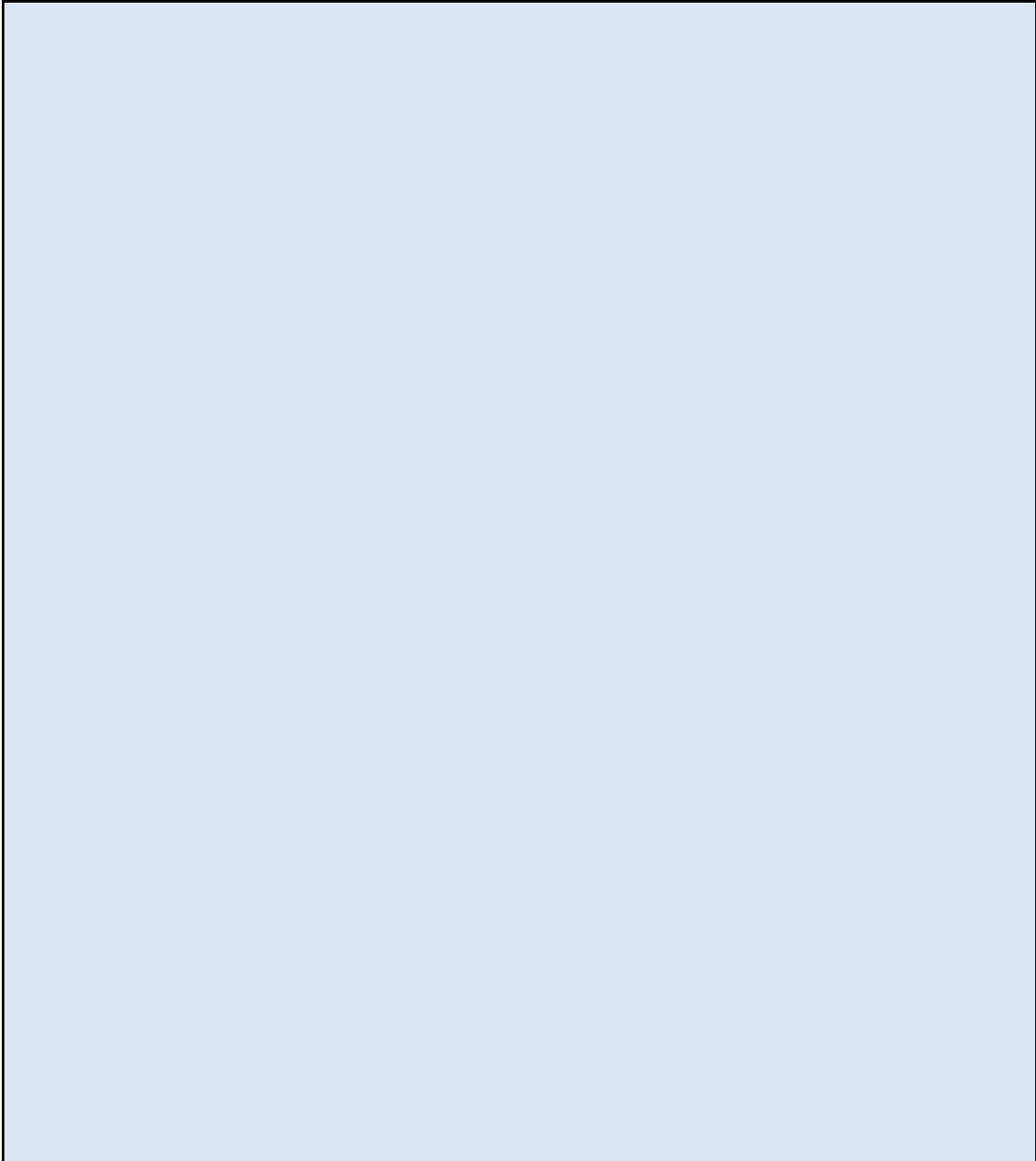
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST T4N-R63W-S32 L02**

Consent Decree Tank System Number: **1326**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is a light blue color.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST USX T3N-R64W-S21 L01\_WALKDOWN**

Consent Decree Tank System Number: **548**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST USX T3N-R64W-S21 L01_FINAL PACKET	.pdf	8/2/2106	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST USX T3N-R64W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	8/5/2016	STEM Engineering Evaluation Spreadsheet
GUTTERSEN ST USX T3N-R64W-S21 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST USX T3N-R64W-S21 L01_FINAL PACKET	.pdf	8/2/2016	Work Request
GUTTERSEN ST USX T3N-R64W-S21 L01_FINAL PACKET	.pdf	8/2/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST USX T3N-R64W-S21 L01_WALKDOWN	.pdf	11/17/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST USX T3N-R64W-S21 L01_IR VERIFICATION	.pdf	7/27/2016	IR Verification Field Data Sheet
GUTTERSEN ST USX T3N-R64W-S21 L01_1330_NORMAL	.mp4	7/25/2016	IR Camera Video Normal Operations
GUTTERSEN ST USX T3N-R64W-S21 L01_1331_DUMP	.mp4	7/25/2016	IR Camera Video During Dump Event
GUTTERSEN ST USX T3N-R64W-S21 L01_1332_POST	.mp4	7/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN ST USX T3N-R64W-S21 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST USX T3N-R64W-S21 L01\_WALKDOWN**

Consent Decree Tank System Number: **548**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,904</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>24,977</b>	<b>24,977</b>	
Total VCS Capacity (scfh)	<b>27,881</b>	<b>30,810</b>	
VCS Capacity minus PPIVF (scfh)	<b>22,897</b>	<b>25,826</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 4/5/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/23/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST USX T3N-R64W-S21 L01\_WALKDOWN**

Consent Decree Tank System Number: **548**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	23	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
Total	4,985	4,984

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN ST USX T3N-R64W-S21 L01\_WALKDOWN**

Consent Decree Tank System Number: **548**

**Audit Notes**

The walkdown checklist (GUTTERSEN ST USX T3N-R64W-S21 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (GUTTERSEN ST USX T3N-R64W-S21 L01\_FINAL PACKET).

The STEM work request (GUTTERSEN ST USX T3N-R64W-S21 L01\_FINAL PACKET, p 3) requests that one of the two LEED 48" VOC burners initially on site be disconnected and removed from the VOC header. The job sheet (GUTTERSEN ST USX T3N-R64W-S21 L01\_FINAL PACKET, p 31) does not mention removing any burners. The STEM model was run with only 1 burner (LEED GEN1-#7) to be conservative.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN T3N-R64W-S9 L01**

Consent Decree Tank System Number: **535**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S9 L01_FINAL PACKET	.pdf	5/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S9 L01_STEM Engineering Evaluation_rev 1	.xlsm	5/12/2017	STEM Engineering Evaluation Spreadsheet
GUTTERSEN T3N-R64W-S9 L01_SIGNED EVAL	.pdf	5/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S9 L01_FINAL PACKET	.pdf	5/10/2017	Work Request
GUTTERSEN T3N-R64W-S9 L01_FINAL PACKET	.pdf	5/10/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S9 L01_FINAL PACKET	.pdf	5/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S9 L01_IR VERIFICATION	.pdf	5/8/2017	IR Verification Field Data Sheet
GUTTERSEN T3N-R64W-S9 L01_2016_NORMAL	.mp4	5/4/2017	IR Camera Video Normal Operations
GUTTERSEN T3N-R64W-S9 L01_2017_DUMP	.mp4	5/4/2017	IR Camera Video During Dump Event
GUTTERSEN T3N-R64W-S9 L01_2018_POST	.mp4	5/4/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S9 L01_SIGNED EVAL	.pdf	5/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GUTTERSEN T3N-R64W-S9 L01**

**Consent Decree Tank System Number:** **535**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,323</b>	<b>10,792</b>	
Headspace Surge Capacity (scfh)	<b>16,411</b>	<b>16,411</b>	
Total VCS Capacity (scfh)	<b>22,734</b>	<b>27,203</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,750</b>	<b>22,218</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 9/17/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN T3N-R64W-S9 L01**

Consent Decree Tank System Number: **535**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

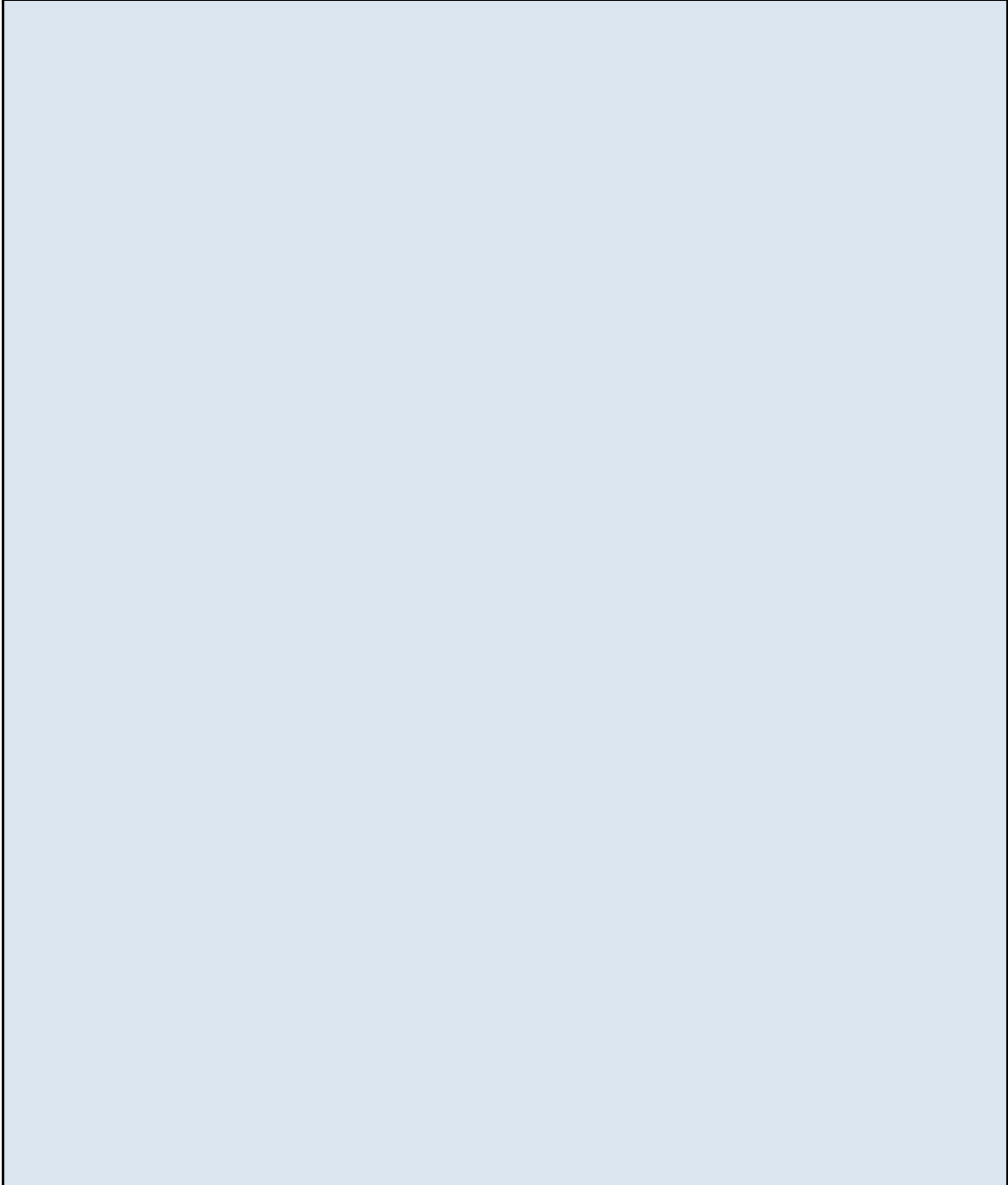
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN T3N-R64W-S9 L01**

Consent Decree Tank System Number: **535**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN T3N-R64W-S33 L02**

Consent Decree Tank System Number: **1327**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S33 L02_FINAL PACKET	.pdf	7/7/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S33 L02_STEM Engineering Evaluation_rev1	.xlsm	7/22/2016	STEM Engineering Evaluation Spreadsheet
GUTTERSEN T3N-R64W-S33 L02_SIGNED EVAL	.pdf	7/26/2017	Final Signed Engineering Evaluation
088_GUTTERSEN T3N-R64W-S33 L02_SIGNED EVAL_rev	.pdf	8/15/2018	Revised Final Signed Engineering Evaluation
088_GUTTERSEN T3N-R64W-S33 L02_STEM Engineering Evaluation_rev1_correction	.xlsm	8/15/2018	Revised STEM Engineering Evaluation Spreadsheet

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S33 L02_FINAL PACKET	.pdf	7/7/2016	Work Request
GUTTERSEN T3N-R64W-S33 L02_FINAL PACKET	.pdf	7/7/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S33 L02_WALKDOWN	.pdf	7/7/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S33 L02_IR VERIFICATION	.pdf	7/6/2016	IR Verification Field Data Sheet
GUTTERSEN T3N-R64W-S33 L02_1235_NORMAL	.mp4	7/5/2016	IR Camera Video Normal Operations
GUTTERSEN T3N-R64W-S33 L02_1236_DUMP	.mp4	7/5/2016	IR Camera Video During Dump Event
GUTTERSEN T3N-R64W-S33 L02_1237_POST	.mp4	7/5/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
GUTTERSEN T3N-R64W-S33 L02_SIGNED EVAL	.pdf	7/26/2017	Final Signed Engineering Evaluation
088_GUTTERSEN T3N-R64W-S33 L02_SIGNED EVAL_rev	.pdf	8/15/2018	Revised Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **GUTTERSEN T3N-R64W-S33 L02**

**Consent Decree Tank System Number:** **1327**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,705</b>	<b>2,705</b>	
Total VCS Capacity (scfh)	<b>5,430</b>	<b>8,538</b>	
VCS Capacity minus PPIVF (scfh)	<b>922</b>	<b>3,850</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/20/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/30/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN T3N-R64W-S33 L02**

Consent Decree Tank System Number: **1327**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN T3N-R64W-S33 L02**

Consent Decree Tank System Number: **1327**

**Audit Notes**

The walkdown checklist (GUTTERSEN T3N-R64W-S33 L02\_WALKDOWN) was not marked as complete. Completion was verified with documents in the final packet (GUTTERSEN T3N-R64W-S33 L02\_FINAL PACKET).

The STEM work request form (GUTTERSEN T3N-R64W-S33 L02\_FINAL PACKET, p 3) requested that the existing LEED burner be replaced with a new Cimarron 48HV Burner. The Job Sheet (GUTTERSEN T3N-R64W-S33 L02\_FINAL PACKET, p 25) states a LEED 48" burner was installed. The signed eval also (GUTTERSEN T3N-R64W-S33 L02\_SIGNED EVAL, p 2) states the burner on site is a LEED 48" Gen 1 #7. LEED 48"

The Field datasheet (GUTTERSEN T3N-R64W-S33 L02\_FINAL PACKET, p 12) states the VOC line from the tanks to the knockout is 2". The signed evaluation (GUTTERSEN T3N-R64W-S33 L02\_Signed Eval, p 2) lists the VOC size from tanks to KO as 3". There is no work request or documentation in the job sheet (GUTTERSEN T3N-R64W-S33 L02\_FINAL PACKET, p 24) indicating the 2" line was replaced with a 3" line. There was no mention of changing the VOC line size in the STEM work request form (GUTTERSEN T3N-R64W-S33 L02\_FINAL PACKET, p 3). Noble acknowledged that the line from the tanks to KO was 2" in their 8/14/2018 response to a data request. A new signed evaluation with a 2" line from the tanks to KO was provided. It is dated 7/17/2018.

There is also no confirmation that the 2" underground VOC line (GUTTERSEN T3N-R64W-S33 L02\_FINAL PACKET, p 15) connecting the KO to the burner was replaced with a 4" line. The model (GUTTERSEN T3N-R64W-S33 L02\_STEM Engineering Evaluation\_rev1) agrees with the signed eval pipe diameters. In a 8/14/2018 response to a data request Noble stated that "Field verification for this facility was completed on or around 5/19/2016. Field verification confirmed that the 2" underground line was replaced with a 4" line to the burner."

Per the walkdown checklist (GUTTERSEN T3N-R64W-S33 L02\_WALKDOWN) A1, and the signed eval (GUTTERSEN T3N-R64W-S33 L02\_SIGNED EVAL, p 2) the trim size was confirmed to be 1/2", However, there is no confirmation of valve size. Therefore the largest valve size (2") was used in the model to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

This site was selected for an additional IR camera inspection because the VCS from the tanks to the burner was filmed over too quickly for visual inspection.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN USX T3N-R64W-S23 L01**

Consent Decree Tank System Number: **558**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GUTTERSEN USX T3N-R64W-S23 L01_FINAL PACKET	pdf	3/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN USX T3N-R64W-S23 L01_SIGNED EVAL	pdf	3/28/2017	Final Signed Engineering Evaluation
GUTTERSEN USX T3N-R64W-S23 L01_STEM Engineering Evaluation_rev1	xlsm	3/24/2017	STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN USX T3N-R64W-S23 L01_FINAL PACKET	pdf	3/20/2017	Work Request
GUTTERSEN USX T3N-R64W-S23 L01_FINAL PACKET	pdf	3/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN USX T3N-R64W-S23 L01_WALKDOWN	pdf	3/14/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN USX T3N-R64W-S23 L01_1853_NORMAL	mp4	3/14/2017	IR Camera Video Normal Operations
GUTTERSEN USX T3N-R64W-S23 L01_1854_DUMP	mp4	3/14/2017	IR Camera Video During Dump Event
GUTTERSEN USX T3N-R64W-S23 L01_1855_POST	mp4	3/14/2017	IR Camera Video Post Dump Event
GUTTERSEN USX T3N-R64W-S23 L01_IR VERIFICATION	pdf	3/14/2017	IR Verification Field Data Sheet

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GUTTERSEN USX T3N-R64W-S23 L01_SIGNED EVAL	pdf	3/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN USX T3N-R64W-S23 L01**

Consent Decree Tank System Number: **558**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,116</b>	<b>22,120</b>	
Total VCS Capacity (scfh)	<b>23,841</b>	<b>27,953</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,333</b>	<b>23,265</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 11/7/2017

Audit Document Review Verified by: K. Malmquist

Audit Document Verification Date: 12/31/2019

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN USX T3N-R64W-S23 L01**

Consent Decree Tank System Number: **558**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GUTTERSEN USX T3N-R64W-S23 L01**

Consent Decree Tank System Number: **558**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 11-16) are not dated. Assumed the date is the same as Facility Scouting date (7/14/2015).

**2. Unable to confirm VOC line size onsite - Request additional data**

STEM Work Request Form (Final Packet pg 3) requests a 4" VOC line be connected to the burner. The STEM Engineering Evaluation indicates a 4" VOC line from KO to burner was used in the calcs. Field Data Notes (Final Packet pg 15) indicate a 2" VOC line from KO to burner existed previously onsite. The Job Sheet (Final Packet pg 19) indicates an above ground line (AGL) was installed, although no indication of the size of the line was observed. If 2" VOC is currently onsite the STEM Engineering Evaluation will be overestimating VCS capacity.

**Request data from Noble to verify VOC line size from KO to burner currently onsite. -**

***Update 8/15/2018 - Noble confirmed a 4" VOC line from KO to burner.***

**3. Unable to confirm oil dump valve size onsite - Request additional data**

The Job Sheet (Final Packet pg 21) indicates both existing separators on site were removed and a new HLP separator was installed. The STEM Work Request (Final Packet pg 3) indicates the LP oil dump was to have a 1" valve with 1/2" trim installed. Item A1 of the the Walkdown Checklist (Final Packet pg 25) indicates the proper oil dump trim size is installed onsite. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**4. Tank banking misinterpretation**

The Signed Walkdown (Final Packet pg 28) indicates the tanks on site are banked. However, the included description of "one bank of two oil tanks" is not in line with the definition of "tank banking". Of the two tanks on site, one is a vapor space tank as indicated by item C13 of the walkdown checklist. Therefore tanks are not banked and the site follows the Signed Eval.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GWAA T5N-R65W-S2 L02**

Consent Decree Tank System Number: **219**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S2 L02_FINAL PACKET	.pdf	8/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S2 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
GWAA T5N-R65W-S2 L02_SIGNED EVAL	.pdf	9/7/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S2 L02_FINAL PACKET	.pdf	8/24/2016	Work Request
GWAA T5N-R65W-S2 L02_FINAL PACKET	.pdf	8/24/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S2 L02_WALKDOWN	.pdf	8/18/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S2 L02_IR VERIFICATION	.pdf	8/18/2016	IR Verification Field Data Sheet
GWAA T5N-R65W-S2 L02_1414_NORMAL	.mp4	8/18/2016	IR Camera Video Normal Operations
GWAA T5N-R65W-S2 L02_1415_DUMP	.mp4	8/18/2016	IR Camera Video During Dump Event
GWAA T5N-R65W-S2 L02_1416_POST	.mp4	8/18/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S2 L02_SIGNED EVAL	.pdf	9/7/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** GWAA T5N-R65W-S2 L02

**Consent Decree Tank System Number:** 219

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,395</b>	<b>4,538</b>	<b>3%</b>
Calculated Burner Capacity (scfh)	<b>2,893</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>13,585</b>	<b>13,585</b>	
Total VCS Capacity (scfh)	<b>16,478</b>	<b>19,418</b>	
VCS Capacity minus PPIVF (scfh)	<b>12,083</b>	<b>14,880</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/29/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GWAA T5N-R65W-S2 L02**

Consent Decree Tank System Number: **219**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	29	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
Total	4,538	4,395

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GWAA T5N-R65W-S2 L02**

Consent Decree Tank System Number: **219**

**Audit Notes**

The STEM Work Request indicated that a GWAA 2-31/32 separator was to be converted to a LP separator. The Job Sheet and Equipment sheets indicate a new LP separator was brought on-site to develop the HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

Site was selected for an IR Camera Inspection because provided IR footage indicated possible emissions release.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GWAA T5N-R65W-S3 L01**

Consent Decree Tank System Number: **216**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S3 L01_FINAL PACKET	.pdf	10/7/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	6/27/2017	STEM Engineering Evaluation Spreadsheet
GWAA T5N-R65W-S3 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S3 L01_FINAL PACKET	.pdf	10/7/2015	Work Request
GWAA T5N-R65W-S3 L01_FINAL PACKET	.pdf	10/7/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S3 L01_WALKDOWN	.pdf	10/7/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S3 L01_IR VERIFICATION	.pdf	10/7/2015	IR Verification Field Data Sheet
GWAA T5N-R65W-S3 L01_0319_NORMAL	.mp4	10/6/2015	IR Camera Video Normal Operations
GWAA T5N-R65W-S3 L01_0320_DUMP	.mp4	10/6/2015	IR Camera Video During Dump Event
GWAA T5N-R65W-S3 L01_0321_POST	.mp4	10/6/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
GWAA T5N-R65W-S3 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** GWAA T5N-R65W-S3 L01

**Consent Decree Tank System Number:** 216

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,513</b>	<b>2,513</b>	
Total VCS Capacity (scfh)	<b>5,440</b>	<b>8,346</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,759</b>	<b>4,664</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/17/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/30/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GWAA T5N-R65W-S3 L01**

Consent Decree Tank System Number: **216**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_T$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_T$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **GWAA T5N-R65W-S3 L01**

Consent Decree Tank System Number: **216**

**Audit Notes**

The walkdown checklist (GWAA T5N-R65W-S3 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (GWAA T5N-R65W-S3 L01\_FINAL PACKET).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAGEMEISTER USX T6N-R63W-S7 L02**

Consent Decree Tank System Number: **1397**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HAGEMEISTER USX T6N-R63W-S7 L02_FINAL PACKET	.pdf	11/18/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HAGEMEISTER USX T6N-R63W-S7 L02_STEM Engineering Evaluation_rev1	.xlsm	1/10/2018	STEM Engineering Evaluation Spreadsheet
HAGEMEISTER USX T6N-R63W-S7 L02_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HAGEMEISTER USX T6N-R63W-S7 L02_FINAL PACKET	.pdf	11/18/2015	Work Request
HAGEMEISTER USX T6N-R63W-S7 L02_FINAL PACKET	.pdf	11/18/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HAGEMEISTER USX T6N-R63W-S7 L02_WALKDOWN	.pdf	11/18/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HAGEMEISTER USX T6N-R63W-S7 L02_IR VERIFICATION	.pdf	11/17/2015	IR Verification Field Data Sheet
HAGEMEISTER USX T6N-R63W-S7 L02_0444_NORMAL	.pdf	11/11/2015	IR Camera Video Normal Operations
HAGEMEISTER USX T6N-R63W-S7 L02_0445_DUMP	.pdf	11/11/2015	IR Camera Video During Dump Event
HAGEMEISTER USX T6N-R63W-S7 L02_0446_POST	.pdf	11/11/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HAGEMEISTER USX T6N-R63W-S7 L02_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAGEMEISTER USX T6N-R63W-S7 L02**

Consent Decree Tank System Number: **1397**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,332</b>	<b>2,332</b>	
Total VCS Capacity (scfh)	<b>6,421</b>	<b>6,932</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,913</b>	<b>2,423</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/25/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/25/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAGEMEISTER USX T6N-R63W-S7 L02**

Consent Decree Tank System Number: **1397**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

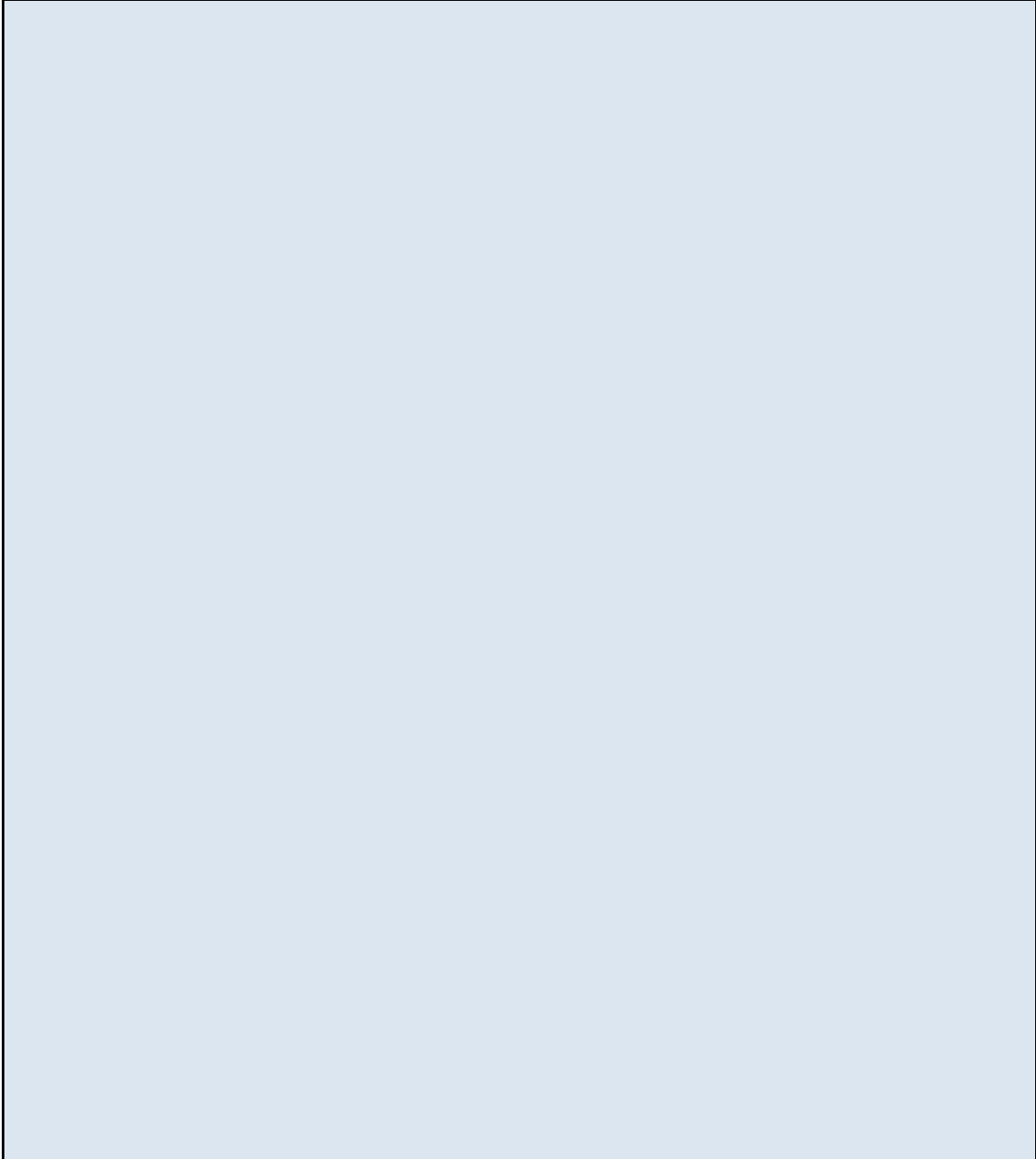
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAGEMEISTER USX T6N-R63W-S7 L02**

Consent Decree Tank System Number: **1397**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01**

Consent Decree Tank System Number: **637**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_FINAL PACKET	.pdf	1/24/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_STEM Engineering Evaluation_rev1	.xls	1/30/2017	STEM Engineering Evaluation Spreadsheet
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_Final Signed STEM Plan	.pdf	2/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_FINAL PACKET	.pdf	1/24/2017	Work Request
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_FINAL PACKET	.pdf	1/24/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_WALKDOWN	.pdf	1/24/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_IR VERIFICATION	.pdf	1/24/2017	IR Verification Field Data Sheet
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_1288_NORMAL	.mp4	1/23/2017	IR Camera Video Normal Operations
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_1290_DUMP	.mp4	1/23/2017	IR Camera Video During Dump Event
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_1291_POST	.mp4	1/23/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01**

Consent Decree Tank System Number: **637**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>120</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,618</b>	<b>5,618</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,735</b>	<b>9,558</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>7,735</b>	<b>9,558</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,117</b>	<b>3,941</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 3/12/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01**

Consent Decree Tank System Number: **637**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.34							
Z2	-0.86							
Z3	0.98							
Z	1.46							
Gas/Oil Ratio (scf/bbl)	209.8							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.91							
Valve Coefficient (gpm/psi) (C)	3.22							
Critical Pressure (psia) <sup>b</sup>	584							
Vapor Pressure (psia) <sup>c</sup>	133							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.83							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	589							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	123.5							
Working Flow (Mscfd) <sup>h,i</sup>	6							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	6	

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	5,147	5,147
Oil Tank Working Rate	233	233
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	5,618	5,618

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAGEN BOCKIUS PFANNBECKER T4N-R64W-S15 L01**

Consent Decree Tank System Number: **637**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

The stem work request form (PG 3 of FINAL PACKET pdf) states the 2" VOC line from tank to KO was to be changed to a 3" line however nowhere in the job sheets (PGs 18 through 22 of FINAL PACKET pdf) does it confirm this task was completed.

**NOBLE RESPONSE:**

Field verification for this facility was completed on or around 8/16/2016, field verification confirmed 3" VOC line from the tank to the KO pot was installed.

This site was an alternate site selected for IR Camera Inspection based upon its system pressure group ( $\geq 186$ ,  $< 233$ )

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAMBERT R T4N-R65W-S32 L01**

Consent Decree Tank System Number: **1296**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HAMBERT R T4N-R65W-S32 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HAMBERT R T4N-R65W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
HAMBERT R T4N-R65W-S32 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HAMBERT R T4N-R65W-S32 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
HAMBERT R T4N-R65W-S32 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HAMBERT R T4N-R65W-S32 L01_SIGNED EVAL	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HAMBERT R T4N-R65W-S32 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
HAMBERT R T4N-R65W-S32 L01_0033_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
HAMBERT R T4N-R65W-S32 L01_0034_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
HAMBERT R T4N-R65W-S32 L01_0035_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HAMBERT R T4N-R65W-S32 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HAMBERT R T4N-R65W-S32 L01**

**Consent Decree Tank System Number:** **1296**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,007</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>556</b>	<b>556</b>	
Total VCS Capacity (scfh)	<b>4,563</b>	<b>5,514</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,119</b>	<b>2,070</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/23/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAMBERT R T4N-R65W-S32 L01**

Consent Decree Tank System Number: **1296**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

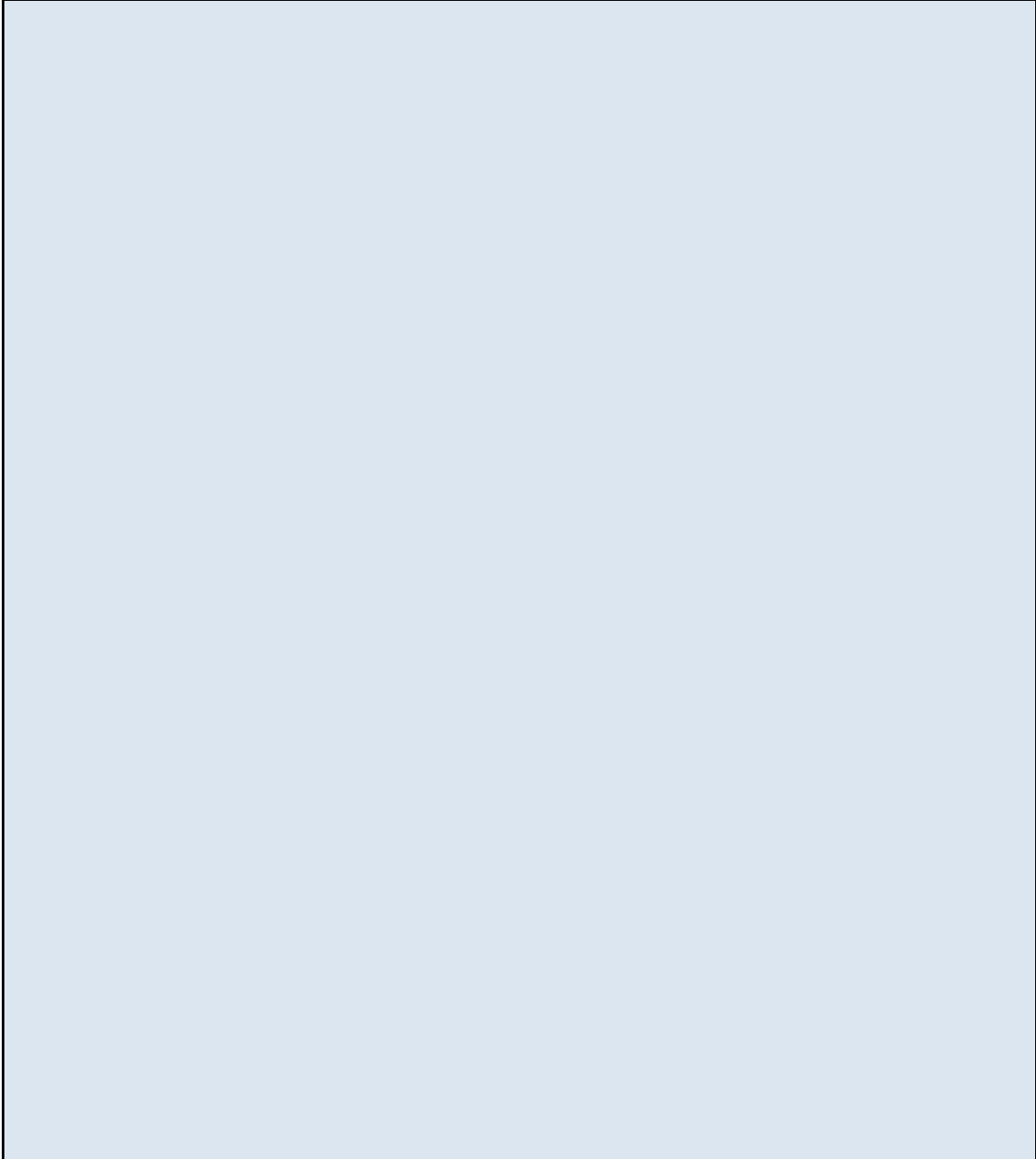
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAMBERT R T4N-R65W-S32 L01**

Consent Decree Tank System Number: **1296**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME HBR T4N-R65W-S11 L01**

Consent Decree Tank System Number: **248**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HANSCOME HBR T4N-R65W-S11 L01_FINAL PACKET	.pdf	8/3/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME HBR T4N-R65W-S11 L01_STEM Engineering Evaluation_rev1	.xlsm	10/30/2017	STEM Engineering Evaluation Spreadsheet
HANSCOME HBR T4N-R65W-S11 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME HBR T4N-R65W-S11 L01_FINAL PACKET	.pdf	8/3/2015	Work Request
HANSCOME HBR T4N-R65W-S11 L01_FINAL PACKET	.pdf	8/3/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME HBR T4N-R65W-S11 L01_WALKDOWN	.pdf	8/3/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME HBR T4N-R65W-S11 L01_IR VERIFICATION	.pdf	7/28/2015	IR Verification Field Data Sheet
HANSCOME HBR T4N-R65W-S11 L01_0188_NORMAL	.mp4	7/27/2015	IR Camera Video Normal Operations
HANSCOME HBR T4N-R65W-S11 L01_0189_DUMP	.mp4	7/27/2015	IR Camera Video During Dump Event
HANSCOME HBR T4N-R65W-S11 L01_0190_POST	.mp4	7/27/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME HBR T4N-R65W-S11 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** HANSCOME HBR T4N-R65W-S11 L01

**Consent Decree Tank System Number:** 248

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	60							
Dump Valve Size & Trim Size (in)	2" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,681	3,825	4%
Calculated Burner Capacity (scfh)	2,927	5,833	
Headspace Surge Capacity (scfh)	2,611	2,611	
Total VCS Capacity (scfh)	5,538	8,444	
VCS Capacity minus PPIVF (scfh)	1,857	4,619	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 12/12/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME HBR T4N-R65W-S11 L01**

Consent Decree Tank System Number: **248**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME HBR T4N-R65W-S11 L01**

Consent Decree Tank System Number: **248**

### Audit Notes

The Work Request indicated the oil dump valve on HLP Separator was to be modified to a 1/2" trim. The Field Data indicated the dump valve was a 2" valve. The Engineering Evaluation was completed with a 1" valve with a 1/2" trim. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME T4N-R64W-S21 L01**

Consent Decree Tank System Number: **1940/762**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_FINAL PACKET	.pdf	5/12/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	5/22/2017	STEM Engineering Evaluation Spreadsheet
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_FINAL PACKET	.pdf	5/12/2017	Work Request
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_FINAL PACKET	.pdf	5/12/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_WALKDOWN	.pdf	5/12/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_IR VERIFICATION	.pdf	5/11/2017	IR Verification Field Data Sheet
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_2038_NORMAL	.mp4	5/9/2017	IR Camera Video Normal Operations
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_2040_DUMP	.mp4	5/9/2017	IR Camera Video During Dump Event
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_2041_POST	.mp4	5/9/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S21 L01 & KLEIN JULIE T4N-R64W-S21 L01_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HANSCOME T4N-R64W-S21 L01**

**Consent Decree Tank System Number:** **1940/762**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,904</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>29,635</b>	<b>11,047</b>	
Total VCS Capacity (scfh)	<b>32,539</b>	<b>16,880</b>	
VCS Capacity minus PPIVF (scfh)	<b>27,555</b>	<b>11,896</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 6/4/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME T4N-R64W-S21 L01**

Consent Decree Tank System Number: **1940/762**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME T4N-R64W-S21 L01**

Consent Decree Tank System Number: **1940/762**

**Audit Notes**

A Work Order request was issued to "bottom out" one tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did confirm the tank was "bottomed out " but the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured for LP separators to produce into all tanks. Requested confirmation from NEI that a tank was bottomed out to create additional vapor headspace.

The NEI data request response confirmed one tank was bottomed out and an updated signed Engineering Evaluation sheet with only one tank bottomed out for a vapor headspace tank was provided.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME T4N-R64W-S28 L03**

Consent Decree Tank System Number: **675/666**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_FINAL PACKET	.pdf	1/5/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_Final Signed STEM Plan	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_FINAL PACKET	.pdf	1/5/2017	Work Request
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_FINAL PACKET	.pdf	1/5/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_WALKDOWN	.pdf	6/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_IR VERIFICATION	.pdf	6/14/2016	IR Verification Field Data Sheet
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_1105_NORMAL	.mp4	6/7/2016	IR Camera Video Normal Operations
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_1106_DUMP	.mp4	6/7/2016	IR Camera Video During Dump Event
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L031_1107_POST	.mp4	6/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HANSCOME T4N-R64W-S28 L01 & HANSCOME T4N-R64W-S28 L03_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** HANSCOME T4N-R64W-S28 L03

**Consent Decree Tank System Number:** 675/666

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,490</b>	<b>2,490</b>	
Total VCS Capacity (scfh)	<b>6,671</b>	<b>7,090</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,163</b>	<b>2,581</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 4/9/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME T4N-R64W-S28 L03**

Consent Decree Tank System Number: **675/666**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSCOME T4N-R64W-S28 L03**

Consent Decree Tank System Number: **675/666**

**Audit Notes**

The final walkdown checklist is not marked as being complete.

This site was selected for IR Camera Inspection based upon its system pressure group ( $\geq 186$ ,  $< 233$ )

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSEN T4N-R67W-S1 L01**

Consent Decree Tank System Number: **1098**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HANSEN T4N-R67W-S1 L01_FINAL PACKET	.pdf	8/15/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HANSEN T4N-R67W-S1 L01_STEM Engineering Evaluation_rev1	.xls	8/23/2016	STEM Engineering Evaluation Spreadsheet
HANSEN T4N-R67W-S1 L01_Final Signed STEM Plan	.pdf	10/19/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HANSEN T4N-R67W-S1 L01_FINAL PACKET	.pdf	8/15/2016	Work Request
HANSEN T4N-R67W-S1 L01_FINAL PACKET	.pdf	8/15/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HANSEN T4N-R67W-S1 L01_WALKDOWN	.pdf	8/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HANSEN T4N-R67W-S1 L01_IR VERIFICATION	.pdf	8/12/2016	IR Verification Field Data Sheet
HANSEN T4N-R67W-S1 L01_1380_NORMAL	.mp4	8/10/2016	IR Camera Video Normal Operations
HANSEN T4N-R67W-S1 L01_1381_DUMP	.mp4	8/10/2016	IR Camera Video During Dump Event
HANSEN T4N-R67W-S1 L01_1382_POST	.mp4	8/10/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HANSEN T4N-R67W-S1 L01_SIGNED EVAL	.pdf	8/25/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSEN T4N-R67W-S1 L01**

Consent Decree Tank System Number: **1098**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,940</b>	<b>1,940</b>	
Total VCS Capacity (scfh)	<b>6,029</b>	<b>6,540</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,348</b>	<b>2,715</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess

Audit Document Review Date: 12/18/2017

Audit Document Review Verified by: James Van Horne

Audit Document Verification Date: 3/30/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSEN T4N-R67W-S1 L01**

Consent Decree Tank System Number: **1098**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C)	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HANSEN T4N-R67W-S1 L01**

Consent Decree Tank System Number: **1098**

**Audit Notes**

-The Walkdown checklist was not marked complete. Modifications were confirmed with other documentation.

-The valve size of the new HLP separator could not be confirmed. The valve trim size was confirmed via the walkdown checklist. The largest valve size with a 1/2" trim was used in these calculations.

This site was selected for IR Camera Inspection based upon the understanding that we could not confirm the modeling guidance was followed

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAPPY TALK AMIGO T4N-R64W-S1 L01**

Consent Decree Tank System Number: **753**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HAPPY TALK AMIGO T4N-R64W-S1 L01_FINAL PACKET	.pdf	1/24/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HAPPY TALK AMIGO T4N-R64W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	1/30/2017	STEM Engineering Evaluation Spreadsheet
HAPPY TALK AMIGO T4N-R64W-S1 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HAPPY TALK AMIGO T4N-R64W-S1 L01_FINAL PACKET	.pdf	1/24/2017	Work Request
HAPPY TALK AMIGO T4N-R64W-S1 L01_FINAL PACKET	.pdf	1/24/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HAPPY TALK AMIGO T4N-R64W-S1 L01_WALKDOWN	.pdf	11/8/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HAPPY TALK AMIGO T4N-R64W-S1 L01_IR VERIFICATION	.pdf	1/24/2017	IR Verification Field Data Sheet
HAPPY TALK AMIGO T4N-R64W-S1 L01_1285_NORMAL	.mp4	1/23/2017	IR Camera Video Normal Operations
HAPPY TALK AMIGO T4N-R64W-S1 L01_1286_DUMP	.mp4	1/23/2017	IR Camera Video During Dump Event
HAPPY TALK AMIGO T4N-R64W-S1 L01_1287_POST	.mp4	1/23/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HAPPY TALK AMIGO T4N-R64W-S1 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAPPY TALK AMIGO T4N-R64W-S1 L01**

Consent Decree Tank System Number: **753**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>120</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,618</b>	<b>5,618</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,735</b>	<b>9,558</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>7,735</b>	<b>9,558</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,117</b>	<b>3,941</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/8/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/9/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAPPY TALK AMIGO T4N-R64W-S1 L01**

Consent Decree Tank System Number: **753**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.34</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.46</b>							
Gas/Oil Ratio (scf/bbl)	<b>209.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.91</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>584</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>133</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>589</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>123.5</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>6</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

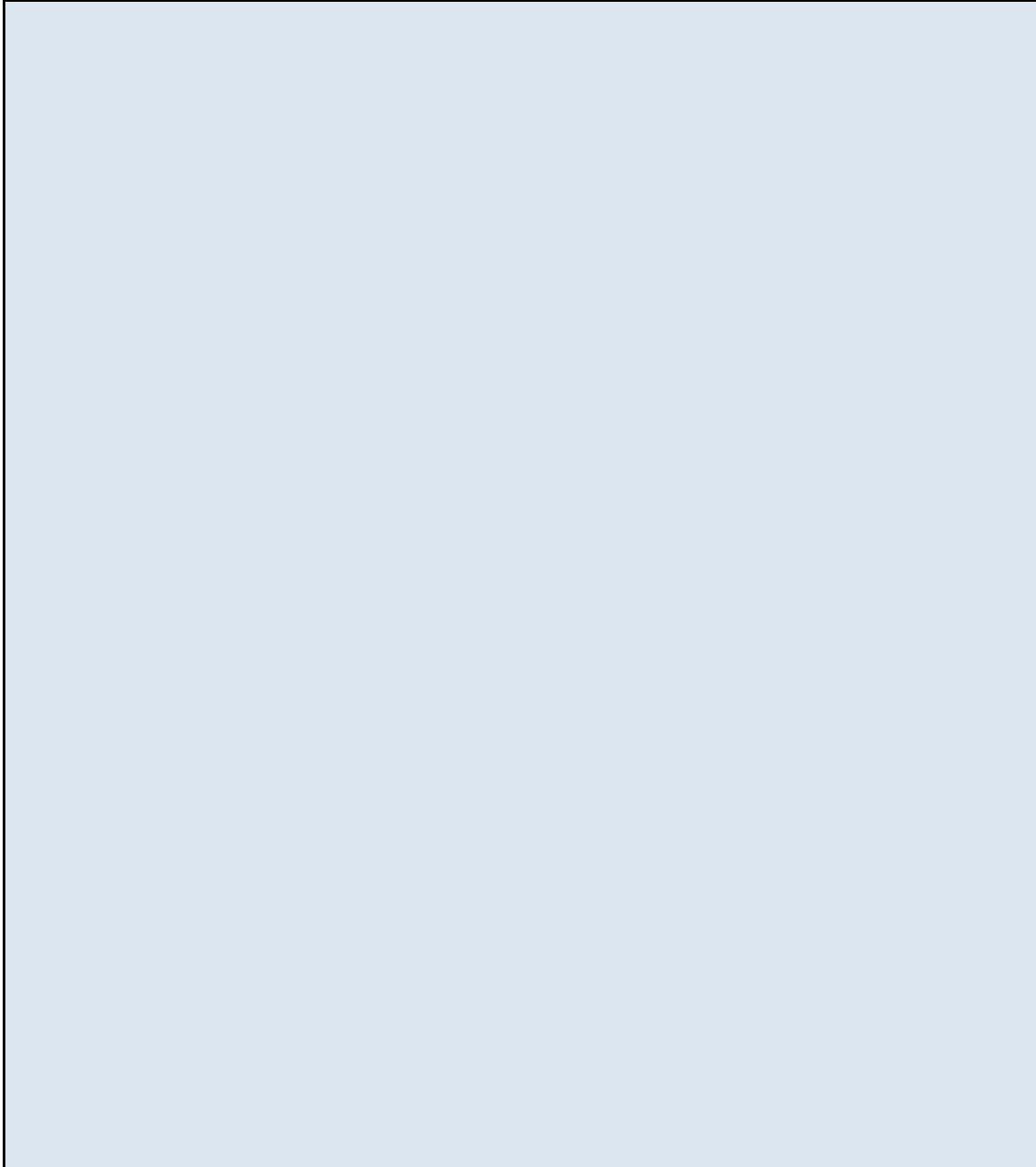
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>5,147</b>	<b>5,147</b>
Oil Tank Working Rate	<b>233</b>	<b>233</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,618</b>	<b>5,618</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HAPPY TALK AMIGO T4N-R64W-S1 L01**

Consent Decree Tank System Number: **753**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HARPER T7N-R65W-S34 L01**

Consent Decree Tank System Number: **1717**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
HARPER T7N-R65W-S34 L01_FINAL PACKET	.pdf	3/30/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
HARPER T7N-R65W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	4/21/2017	STEM Engineering Evaluation Spreadsheet
HARPER T7N-R65W-S34 L01_SIGNED EVAL	.pdf	6/6/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
HARPER T7N-R65W-S34 L01_FINAL PACKET	.pdf	3/30/2017	Work Request
HARPER T7N-R65W-S34 L01_FINAL PACKET	.pdf	3/30/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
HARPER T7N-R65W-S34 L01_WALKDOWN	.pdf	3/30/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
HARPER T7N-R65W-S34 L01_IR VERIFICATION	.pdf	3/30/2017	IR Verification Field Data Sheet
HARPER T7N-R65W-S34 L01_1905_NORMAL	.mp4	3/28/2017	IR Camera Video Normal Operations
HARPER T7N-R65W-S34 L01_1906_DUMP	.mp4	3/28/2017	IR Camera Video During Dump Event
HARPER T7N-R65W-S34 L01_1908_POST	.mp4	3/28/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
HARPER T7N-R65W-S34 L01_SIGNED EVAL	.pdf	4/25/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** HARPER T7N-R65W-S34 L01

**Consent Decree Tank System Number:** 1717

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	60							
Dump Valve Size & Trim Size (in)	2" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,681	3,825	4%
Calculated Burner Capacity (scfh)	2,957	5,833	
Headspace Surge Capacity (scfh)	13,730	13,730	
Total VCS Capacity (scfh)	16,687	19,563	
VCS Capacity minus PPIVF (scfh)	13,006	15,738	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 4/4/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 4/18/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HARPER T7N-R65W-S34 L01**

Consent Decree Tank System Number: **1717**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C)	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HARPER T7N-R65W-S34 L01**

Consent Decree Tank System Number: **1717**

**Audit Notes**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HARRISON KOCH RAY T4N-R65W-S32 L01**

**Consent Decree Tank System Number:** **2360**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HARRISON KOCH RAY T4N-R65W-S32 L01_FINAL PACKET	.pdf	6/24/2016	Pre-Evaluation Facility Inspection
028_HARRISON KOCH RAY T4N-R65W-S32 L01 Facility Walkdown	.pdf	2/20/2018	Legable Field Data Sheets from Data Request

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HARRISON KOCH RAY T4N-R65W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
HARRISON KOCH RAY T4N-R65W-S32 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HARRISON KOCH RAY T4N-R65W-S32 L01_FINAL PACKET	.pdf	6/24/2016	Work Request
HARRISON KOCH RAY T4N-R65W-S32 L01_FINAL PACKET	.pdf	6/24/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HARRISON KOCH RAY T4N-R65W-S32 L01_WALKDOWN	.pdf	6/24/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HARRISON KOCH RAY T4N-R65W-S32 L01_IR VERIFICATION	.pdf	6/24/2016	IR Verification Field Data Sheet
HARRISON KOCH RAY T4N-R65W-S32 L01_1185_NORMAL	.mp4	6/23/2016	IR Camera Video Normal Operations
HARRISON KOCH RAY T4N-R65W-S32 L01_1186_DUMP	.mp4	6/23/2016	IR Camera Video During Dump Event
HARRISON KOCH RAY T4N-R65W-S32 L01_1187_POST	.mp4	6/23/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HARRISON KOCH RAY T4N-R65W-S32 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HARRISON KOCH RAY T4N-R65W-S32 L01**

**Consent Decree Tank System Number:** **2360**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,383</b>	<b>2,383</b>	
Total VCS Capacity (scfh)	<b>6,472</b>	<b>6,983</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,390</b>	<b>2,900</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/22/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/2/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HARRISON KOCH RAY T4N-R65W-S32 L01**

Consent Decree Tank System Number: **2360**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** HARRISON KOCH RAY T4N-R65W-S32 L01

**Consent Decree Tank System Number:** 2360

**Audit Notes**

The Walkdown Checklist (HARRISON KOCH RAY T4N-R65W-S32 L01\_WALKDOWN.pdf, pg. 4) did not indicate if all items on the Work Request form had been completed. Completion of the Work Request was verified through other documentation in the Final Packet.

The Job Sheet (HARRISON KOCH RAY T4N-R65W-S32 L01\_FINAL PACKET.pdf, pg. 23-27) and the QC Stem Checkout (HARRISON KOCH RAY T4N-R65W-S32 L01\_FINAL PACKET.pdf, pg. 22) were used to identify equipment removed and the presence of the LP separator. The oil tank count and size were obtained from the IR camera videos (HARRISON KOCH RAY T4N-R65W-S32 L01\_1185\_NORMAL.mp4) and supplied photo from the data request from 11/30/2018 (028\_HARRISON KOCH RAY T4N-R65W-S32 L01 Crude Oil Tanks (1)). The Job description (HARRISON KOCH RAY T4N-R65W-S32 L01\_FINAL PACKET.pdf, pg. 23) confirms the valve is 1" and the trim was updated to 1/2" as requested.

This site was selected for an additional IR camera inspection because the VCS line was panned over very quickly and it was difficult to inspect for possible leaks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01**

Consent Decree Tank System Number: **2260**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_FINAL PACKET	.pdf	7/7/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_STEM Engineering Evaluation_rev1	.xls	7/22/2016	STEM Engineering Evaluation Spreadsheet
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_Final Signed STEM Plan	.pdf	10/19/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_FINAL PACKET	.pdf	7/7/2016	Work Request
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_FINAL PACKET	.pdf	7/7/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_WALKDOWN	.pdf	7/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_IR VERIFICATION	.pdf	7/7/2016	IR Verification Field Data Sheet
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_1241_NORMAL	.mp4	7/6/2016	IR Camera Video Normal Operations
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_1242_DUMP	.mp4	7/6/2016	IR Camera Video During Dump Event
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_1243_POST	.mp4	7/6/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01_SIGNED EVAL	.pdf	7/26/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01**

**Consent Decree Tank System Number:** **2260**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,787</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>1,880</b>	<b>1,880</b>	
Total VCS Capacity (scfh)	<b>5,667</b>	<b>6,433</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,986</b>	<b>2,608</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess

Audit Document Review Date: 3/14/2018

Audit Document Review Verified by: Jesse Hanshaw

Audit Document Verification Date: 5/21/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01**

Consent Decree Tank System Number: **2260**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HARTMAN KOSKELA LAURICE SHELTON T3N-R65W-S1 L01**

Consent Decree Tank System Number: **2260**

**Audit Notes**

The final walkdown checklist is not marked as being complete.

This site was selected for IR Camera Inspection based upon its system pressure group (<186)

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HEINZE USX T7N-R64W-S29 L01**

Consent Decree Tank System Number: **1490**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HEINZE USX T7N-R64W-S29 L01_FINAL PACKET	.pdf	8/27/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HEINZE USX T7N-R64W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	8/27/2018	STEM Engineering Evaluation Spreadsheet
HEINZE USX T7N-R64W-S29 L01_SIGNED EVAL	.pdf	8/27/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HEINZE USX T7N-R64W-S29 L01_FINAL PACKET	.pdf	8/27/2018	Work Request
HEINZE USX T7N-R64W-S29 L01_FINAL PACKET	.pdf	8/27/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HEINZE USX T7N-R64W-S29 L01_WALKDOWN	.pdf	8/27/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HEINZE USX T7N-R64W-S29 L01_IR VERIFICATION	.pdf	8/27/2018	IR Verification Field Data Sheet
HEINZE USX T7N-R64W-S29 L01_2166_NORMAL	.mp4	8/27/2018	IR Camera Video Normal Operations
HEINZE USX T7N-R64W-S29 L01_2167_DUMP	.mp4	8/27/2018	IR Camera Video During Dump Event
HEINZE USX T7N-R64W-S29 L01_2168_POST	.mp4	8/27/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HEINZE USX T7N-R64W-S29 L01_SIGNED EVAL	.pdf	8/27/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** HEINZE USX T7N-R64W-S29 L01

**Consent Decree Tank System Number:** 1490

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	500
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	Cimarron 48 HV			
Number of Units	1			
Man. Capacity (MSCFD)	109.272			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,429	3,227	-27%
Calculated Burner Capacity (scfh)	3,812	4,553	
Headspace Surge Capacity (scfh)	4,577	4,577	
Total VCS Capacity (scfh)	8,389	9,130	
VCS Capacity minus PPIVF (scfh)	3,960	5,903	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury

Audit Document Review Date: 8/28/2018

Audit Document Review Verified by: Chris Boggess

Audit Document Verification Date: 8/28/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HEINZE USX T7N-R64W-S29 L01**

Consent Decree Tank System Number: **1490**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>396</b>	<b>0</b>
Mscfd	<b>10</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>3,720</b>
Oil Tank Working Rate	<b>275</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>396</b>	<b>396</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,227</b>	<b>4,429</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HEINZE USX T7N-R64W-S29 L01**

Consent Decree Tank System Number: **1490**

**Audit Notes**

Emissions were observed emanating from the PRV on top of the tank in both the DUMP and POST-DUMP videos around the 2:05 to 2:10 mark in both videos.

The QC Stem (PG 25 of Final Packet pdf) verifies the pressure of LP to have been set to shut in at 55psig as requested in the work request (PG 3 of final packet pdf) however the signed eval and stem engineering evaluation show site to have been modeled with the pressure set at 70 psig. PPIVFR was overestimated in the signed evaluation therefore the modeling guideline was still strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBST DARLENE DINNEL T4N-R64W-S22 L01**

Consent Decree Tank System Number: **479**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HERBST DARLENE DINNEL T4N-R64W-S22 L01_FINAL PACKET	.pdf	3/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HERBST DARLENE DINNEL T4N-R64W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	3/15/2016	STEM Engineering Evaluation Spreadsheet
HERBST DARLENE DINNEL T4N-R64W-S22 L01_SIGNED EVAL	.pdf	3/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HERBST DARLENE DINNEL T4N-R64W-S22 L01_FINAL PACKET	.pdf	3/11/2016	Work Request
HERBST DARLENE DINNEL T4N-R64W-S22 L01_FINAL PACKET	.pdf	3/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HERBST DARLENE DINNEL T4N-R64W-S22 L01_WALKDOWN	.pdf	3/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HERBST DARLENE DINNEL T4N-R64W-S22 L01_IR VERIFICATION	.pdf	3/11/2016	IR Verification Field Data Sheet
HERBST DARLENE DINNEL T4N-R64W-S22 L01_0753_NORMAL	.mp4	3/9/2016	IR Camera Video Normal Operations
HERBST DARLENE DINNEL T4N-R64W-S22 L01_0754_DUMP	.mp4	3/9/2016	IR Camera Video During Dump Event
HERBST DARLENE DINNEL T4N-R64W-S22 L01_0755_POST	.mp4	3/9/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HERBST DARLENE DINNEL T4N-R64W-S22 L01_SIGNED EVAL	.pdf	3/16/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HERBST DARLENE DINNEL T4N-R64W-S22 L01**

**Consent Decree Tank System Number:** **479**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>5,164</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,575</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>24,776</b>	<b>24,776</b>	
Total VCS Capacity (scfh)	<b>27,351</b>	<b>30,609</b>	
VCS Capacity minus PPIVF (scfh)	<b>22,367</b>	<b>25,445</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 4/17/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBST DARLENE DINNEL T4N-R64W-S22 L01**

Consent Decree Tank System Number: **479**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,164</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBST DARLENE DINNEL T4N-R64W-S22 L01**

Consent Decree Tank System Number: **479**

**Audit Notes**

The Work Request indicated a replacement of the Kimray 212 dump valve on separator 1 with a 1" 1400 Kimray with a 1/2" trim. Could not verify the valve size (2" or 1") of separator 1. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, indicates all tank fill lines are configured to enable LP separators to produce into all tanks.

Additional information is needed to clarify the inconsistent and conflicting information, thus it is unknown whether the Engineering Design Standard for properly applied.

Noble Response to Data Request:

Field verification for this facility was completed on or around 2/26/16, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBST T5N-R64W-S27 L03**

Consent Decree Tank System Number: **1102**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
HERBST T5N-R64W-S27 L03_FINAL PACKET	.pdf	6/22/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
HERBST T5N-R64W-S27 L03_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
HERBST T5N-R64W-S27 L03_SIGNED EVAL	.pdf	7/7/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
HERBST T5N-R64W-S27 L03_FINAL PACKET	.pdf	6/22/2016	Work Request
HERBST T5N-R64W-S27 L03_FINAL PACKET	.pdf	6/22/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
HERBST T5N-R64W-S27 L03_WALKDOWN	.pdf	6/16/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
HERBST T5N-R64W-S27 L03_IR VERIFICATION	.pdf	6/16/2016	IR Verification Field Data Sheet
HERBST T5N-R64W-S27 L03_1143_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
HERBST T5N-R64W-S27 L03_1144_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
HERBST T5N-R64W-S27 L03_1145_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
HERBST T5N-R64W-S27 L03_SIGNED EVAL	.pdf	7/7/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** HERBST T5N-R64W-S27 L03

**Consent Decree Tank System Number:** 1102

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,123</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,123</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,055</b>	<b>1,405</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBST T5N-R64W-S27 L03**

Consent Decree Tank System Number: **1102**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBST T5N-R64W-S27 L03**

Consent Decree Tank System Number: **1102**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 20) indicates a new D-Grade LP Separator was installed onsite and ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 7) is checked "yes" indicating the oil dump trim is consistent with the Engineering Evaluation, and is therefore 1/2". There is no indication of the oil dump valve size installed in the separator onsite.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the LP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBSTER T5N-R65W-S26 L01**

Consent Decree Tank System Number: 1612 / 1032

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HERBSTER T5N-R65W-S26 L01_FINAL PACKET	.pdf	11/5/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HERBSTER T5N-R65W-S26 L01_STEM Engineering Evaluation_rev1	.xls	11/14/2016	STEM Engineering Evaluation Spreadsheet
HERBSTER T5N-R65W-S26 L01_Final Signed STEM Plan	.pdf	1/24/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HERBSTER T5N-R65W-S26 L01_FINAL PACKET	.pdf	11/5/2016	Work Request
HERBSTER T5N-R65W-S26 L01_FINAL PACKET	.pdf	11/5/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HERBSTER T5N-R65W-S26 L01_WALKDOWN	.pdf	11/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HERBSTER T5N-R65W-S26 L01_IR VERIFICATION	.pdf	11/14/2016	IR Verification Field Data Sheet
HERBSTER T5N-R65W-S26 L01_1696_NORMAL	.mp4	11/10/2016	IR Camera Video Normal Operations
HERBSTER T5N-R65W-S26 L01_1697_DUMP	.mp4	11/10/2016	IR Camera Video During Dump Event
HERBSTER T5N-R65W-S26 L01_1698_POST	.mp4	11/10/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HERBSTER T5N-R65W-S26 L01_SIGNED EVAL	.pdf	11/17/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBSTER T5N-R65W-S26 L01**

Consent Decree Tank System Number: **1612 / 1032**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,271</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,356</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>175</b>	<b>175</b>	
Total VCS Capacity (scfh)	<b>5,531</b>	<b>10,608</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,260</b>	<b>6,337</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 3/13/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/29/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBSTER T5N-R65W-S26 L01**

Consent Decree Tank System Number: **1612 / 1032**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,271</b>	<b>4,271</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HERBSTER T5N-R65W-S26 L01**

Consent Decree Tank System Number: **1612 / 1032**

### Audit Notes

The stem design confirmation form (PG 8 of FINAL PACKET pdf) states only one tank is associated with the site however two tanks are listed on the field data sheets (PGs 15 & 24 of PDF) as being associated with the site and no where on the stem work request form or job sheets does it state one tank was removed from site  
CB - The "No" response to "Is the number of Oil Tanks correct?" was changed to "Yes". See following explanation.

CB - This production pad initially included two separate production facilities. The STEM Work Request does not explicitly request the removal of an oil tank but does describe hooking up all existing wells and comingling production through one production train (Herbster). Recent satellite photos (10/14/2017) confirm the removal of one of the production trains, including the tank, and installation of a new burner.

CB - There is one contradiction between the Job Sheet and the Work Request Form and QC STEM Checkout Job sheet states PSHH was set to 60 psig. QC STEM Checkout form states it was calibrated to 70 psig. The Engineering Evaluation used the greater of the two pressures (70 psig) which, for the purposes of the evaluation, is the most conservative value. No further clarification is needed.

CB - There is no confirmation in the Job Sheet that the oil dump valve trim is 1/2". Item A1 of the STEM Retrofit Walkdown Checklist will be taken as confirmation that the trim is consistent with the evaluation.

CB - No additional information is needed for this audit checklist.

This site was selected for IR Camera Inspection based upon its system pressure group ( $\geq 186$ ,  $< 233$ )

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HKS T6N-R66W-S6 L01**

Consent Decree Tank System Number: **2**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HKS T6N-R66W-S6 L01_FINAL PACKET	.pdf	5/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HKS T6N-R66W-S6 L01_STEM Engineering Evaluation_rev1	.xlsm	4/22/2016	STEM Engineering Evaluation Spreadsheet
HKS T6N-R66W-S6 L01_SIGNED EVAL	.pdf	4/25/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HKS T6N-R66W-S6 L01_FINAL PACKET	.pdf	5/11/2018	Work Request
HKS T6N-R66W-S6 L01_FINAL PACKET	.pdf	5/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HKS T6N-R66W-S6 L01_WALKDOWN	.pdf	4/25/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HKS T6N-R66W-S6 L01_IR VERIFICATION	.pdf	4/27/2018	IR Verification Field Data Sheet
HKS T6N-R66W-S6 L01_0890_NORMAL	.mp4	4/19/2016	IR Camera Video Normal Operations
HKS T6N-R66W-S6 L01_0891_DUMP	.mp4	4/19/2016	IR Camera Video During Dump Event
HKS T6N-R66W-S6 L01_0892_POST	.mp4	4/19/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HKS T6N-R66W-S6 L01_SIGNED EVAL	.pdf	4/25/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HKS T6N-R66W-S6 L01**

Consent Decree Tank System Number: **2**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,648</b>	<b>2,648</b>	
Total VCS Capacity (scfh)	<b>5,374</b>	<b>8,481</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,693</b>	<b>4,799</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/3/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/4/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HKS T6N-R66W-S6 L01**

Consent Decree Tank System Number: **2**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_T$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_T$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HKS T6N-R66W-S6 L01**

Consent Decree Tank System Number:

2

**Audit Notes**

The walkdown checklist (HKS T6N-R66W-S6 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (HKS T6N-R66W-S6 L01\_FINAL PACKET).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD T6N-R64W-S27 L03**

Consent Decree Tank System Number: **1322**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
HOWARD T6N-R64W-S27 L03_FINAL PACKET	.pdf	5/19/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD T6N-R64W-S27 L03_STEM Engineering Evaluation_rev1	.xlsm	5/22/2017	STEM Engineering Evaluation Spreadsheet
HOWARD T6N-R64W-S27 L03_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD T6N-R64W-S27 L03_FINAL PACKET	.pdf	5/19/2017	Work Request
HOWARD T6N-R64W-S27 L03_FINAL PACKET	.pdf	5/19/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD T6N-R64W-S27 L03_WALKDOWN	.pdf	5/19/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD T6N-R64W-S27 L03_IR VERIFICATION	.pdf	5/18/2017	IR Verification Field Data Sheet
HOWARD T6N-R64W-S27 L03_2072_NORMAL	.mp4	5/17/2017	IR Camera Video Normal Operations
HOWARD T6N-R64W-S27 L03_2073_DUMP	.mp4	5/17/2017	IR Camera Video During Dump Event
HOWARD T6N-R64W-S27 L03_2074_POST	.mp4	5/17/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD T6N-R64W-S27 L03_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD T6N-R64W-S27 L03**

Consent Decree Tank System Number: **1322**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,957</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>11,871</b>	<b>11,871</b>	
Total VCS Capacity (scfh)	<b>14,828</b>	<b>17,704</b>	
VCS Capacity minus PPIVF (scfh)	<b>10,746</b>	<b>13,621</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/6/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/11/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD T6N-R64W-S27 L03**

Consent Decree Tank System Number: **1322**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

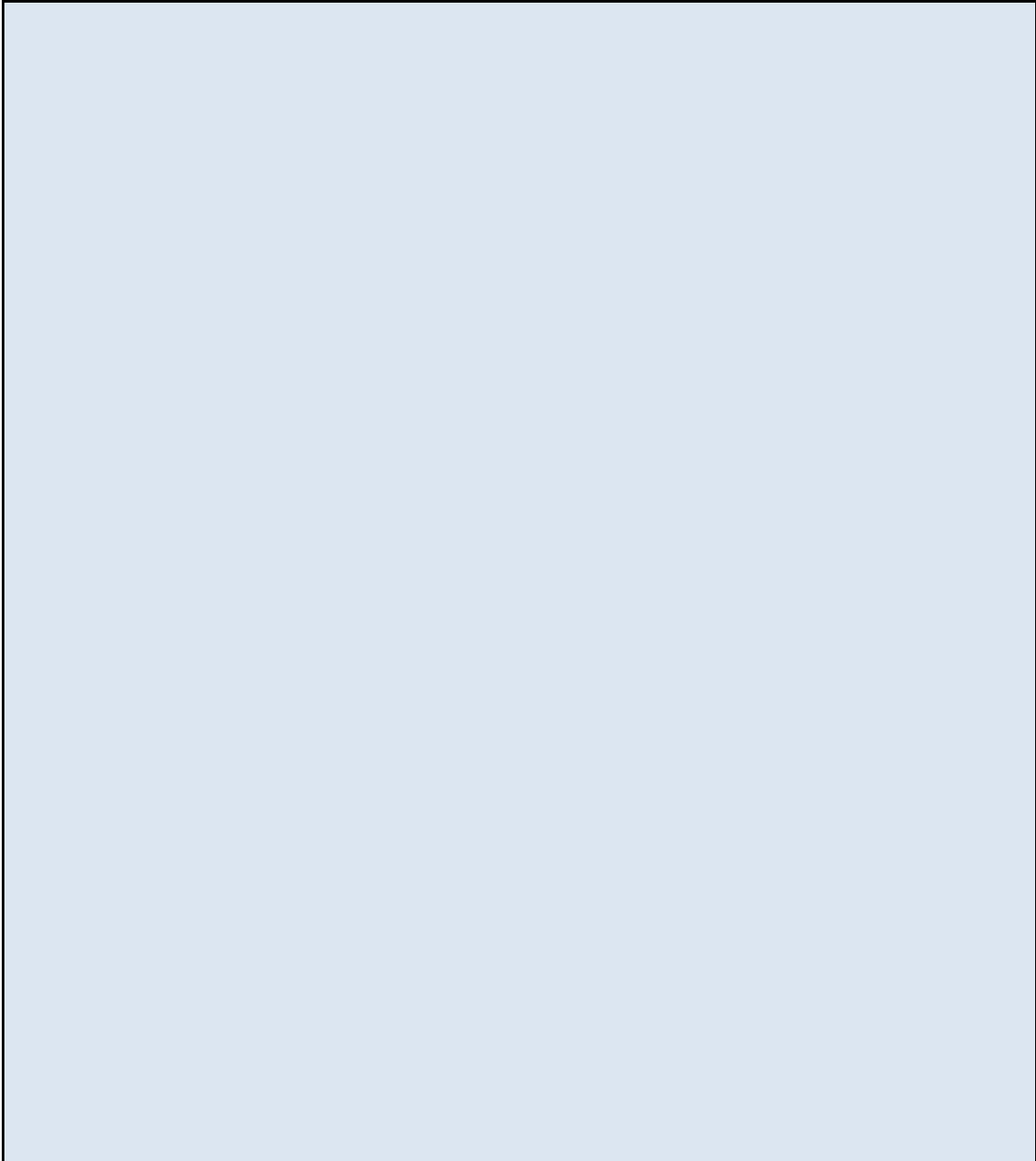
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD T6N-R64W-S27 L03**

Consent Decree Tank System Number: **1322**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD USX T6N-R64W-S9 L01**

Consent Decree Tank System Number: **1408**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L01_FINAL PACKET	.pdf	10/21/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	1/10/2018	STEM Engineering Evaluation Spreadsheet
HOWARD USX T6N-R64W-S9 L01_SIGNED EVAL	.pdf	1/11/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L01_FINAL PACKET	.pdf	10/21/2015	Work Request
HOWARD USX T6N-R64W-S9 L01_FINAL PACKET	.pdf	10/21/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L01_WALKDOWN	.pdf	10/20/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L01_IR VERIFICATION	.pdf	10/20/2015	IR Verification Field Data Sheet
HOWARD USX T6N-R64W-S9 L01_0359_NORMAL	.mp4	10/20/2015	IR Camera Video Normal Operations
HOWARD USX T6N-R64W-S9 L01_0360_DUMP	.mp4	10/20/2015	IR Camera Video During Dump Event
HOWARD USX T6N-R64W-S9 L01_0361_POST	.mp4	10/20/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L01_SIGNED EVAL	.pdf	1/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD USX T6N-R64W-S9 L01**

Consent Decree Tank System Number: **1408**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,796</b>	<b>7,797</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,697</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>4,711</b>	<b>4,711</b>	
Total VCS Capacity (scfh)	<b>11,408</b>	<b>15,144</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,612</b>	<b>7,347</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/20/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD USX T6N-R64W-S9 L01**

Consent Decree Tank System Number: **1408**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.80</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>162.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,753</b>	<b>6,753</b>
Oil Tank Working Rate	<b>569</b>	<b>568</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>7,797</b>	<b>7,796</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD USX T6N-R64W-S9 L01**

Consent Decree Tank System Number: **1408**

**Audit Notes**

No comments, all documentation is consistent with Modeling Guideline, Engineering Design Standard and itself.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD USX T6N-R64W-S9 L02**

Consent Decree Tank System Number: **1929**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L02_FINAL PACKET	.pdf	9/29/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L02_STEM Engineering Evaluation_rev1	.xlsm	3/5/2017	STEM Engineering Evaluation Spreadsheet
HOWARD USX T6N-R64W-S9 L02_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L02_FINAL PACKET	.pdf	9/29/2015	Work Request
HOWARD USX T6N-R64W-S9 L02_FINAL PACKET	.pdf	9/29/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L02_WALKDOWN	.pdf	9/29/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L02_IR VERIFICATION	.pdf	9/25/2015	IR Verification Field Data Sheet
HOWARD USX T6N-R64W-S9 L02_0264_NORMAL	.mp4	9/24/2015	IR Camera Video Normal Operations
HOWARD USX T6N-R64W-S9 L02_0265_DUMP	.mp4	9/24/2015	IR Camera Video During Dump Event
HOWARD USX T6N-R64W-S9 L02_0266_POST	.mp4	9/24/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HOWARD USX T6N-R64W-S9 L02_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HOWARD USX T6N-R64W-S9 L02**

**Consent Decree Tank System Number:** **1929**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,314</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>5,311</b>	<b>5,311</b>	
Total VCS Capacity (scfh)	<b>10,625</b>	<b>16,978</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,641</b>	<b>11,993</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:	Davis Neeper
Audit Document Review Date:	7/20/2018
Audit Document Review Verified by:	Angela M. Oberlander
Audit Document Verification Date:	8/16/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD USX T6N-R64W-S9 L02**

Consent Decree Tank System Number: **1929**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

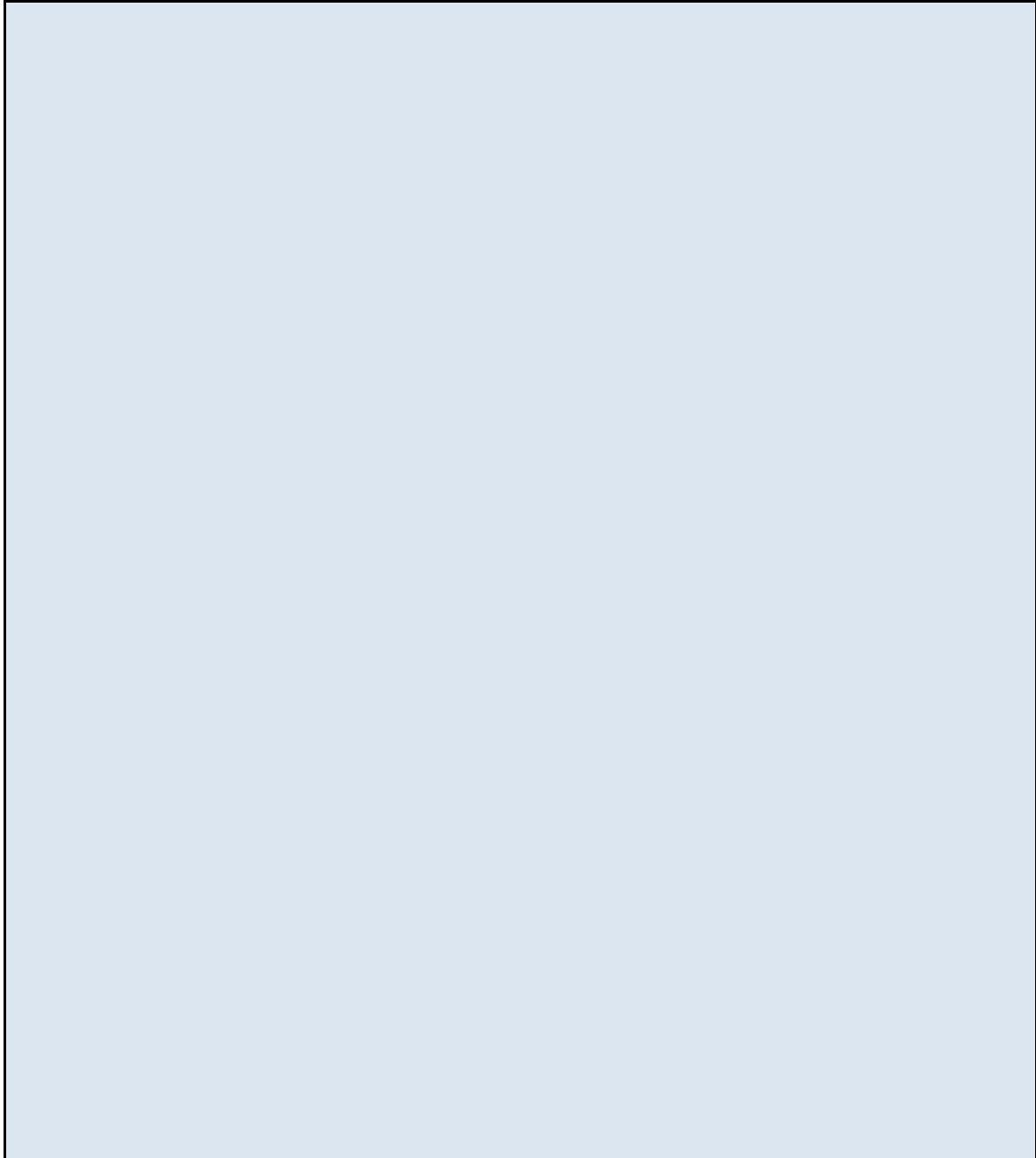
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWARD USX T6N-R64W-S9 L02**

Consent Decree Tank System Number: **1929**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWELL NELSON T4N-R64W-S32 L01**

Consent Decree Tank System Number: **1753**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HOWELL NELSON T4N-R64W-S32 L01_FINAL PACKET	.pdf	1/27/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HOWELL NELSON T4N-R64W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	1/30/2017	STEM Engineering Evaluation Spreadsheet
HOWELL NELSON T4N-R64W-S32 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HOWELL NELSON T4N-R64W-S32 L01_FINAL PACKET	.pdf	1/27/2017	Work Request
HOWELL NELSON T4N-R64W-S32 L01_FINAL PACKET	.pdf	1/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HOWELL NELSON T4N-R64W-S32 L01_WALKDOWN	.pdf	1/27/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HOWELL NELSON T4N-R64W-S32 L01_IR VERIFICATION	.pdf	10/10/2017	IR Verification Field Data Sheet
HOWELL NELSON T4N-R64W-S32 L01_1299_NORMAL	.mp4	1/24/2017	IR Camera Video Normal Operations
HOWELL NELSON T4N-R64W-S32 L01_1300_DUMP	.mp4	1/24/2017	IR Camera Video During Dump Event
HOWELL NELSON T4N-R64W-S32 L01_1301_POST	.mp4	1/24/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HOWELL NELSON T4N-R64W-S32 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HOWELL NELSON T4N-R64W-S32 L01**

**Consent Decree Tank System Number:** **1753**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>439</b>	<b>439</b>	
Total VCS Capacity (scfh)	<b>4,466</b>	<b>5,397</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,022</b>	<b>1,810</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 11/21/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/3/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWELL NELSON T4N-R64W-S32 L01**

Consent Decree Tank System Number: **1753**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HOWELL NELSON T4N-R64W-S32 L01**

Consent Decree Tank System Number: **1753**

**Audit Notes**

The Walkdown Checklist (HOWELL NELSON T4N-R64W-S32 L01\_WALKDOWN.pdf, pg. 4) did not indicate if all items on the Work Request form had been completed. Completion of the Work Request was verified through other documentation in the Final Packet.

Per the Work Request (HOWELL NELSON T4N-R64W-S32 L01\_FINAL PACKET.pdf, pg. 3) the dump valves on the LP separator were to be replaced with a 1" valve with 1/2" trim. The Job Sheet (HOWELL NELSON T4N-R64W-S32 L01\_FINAL PACKET.pdf, pg 18) confirms a 1/2" trim, but does not include a reference to replace the dump valve or confirmation of size as 1". A 2" valve was used in these calculations to be conservative. It is unknown if the modeling guideline was strictly followed for the tank system.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR CULLEN PORTER T3N-R65W-S11 L01\_WALK DOWN**

Consent Decree Tank System Number: **2203**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HSR CULLEN PORTER T3N-R65W-S11 L01_FINAL PACKET	.pdf	10/26/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HSR CULLEN PORTER T3N-R65W-S11 L01_STEM Engineering Evaluation_rev1	.xlsm	10/26/2017	STEM Engineering Evaluation Spreadsheet
HSR CULLEN PORTER T3N-R65W-S11 L01_SIGNED EVAL	.pdf	11/8/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HSR CULLEN PORTER T3N-R65W-S11 L01_FINAL PACKET	.pdf	10/26/2017	Work Request
HSR CULLEN PORTER T3N-R65W-S11 L01_FINAL PACKET	.pdf	10/26/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HSR CULLEN PORTER T3N-R65W-S11 L01_WALK DOWN	.pdf	10/26/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HSR CULLEN PORTER T3N-R65W-S11 L01_IR VERIFICATION	.pdf	3/19/2018	IR Verification Field Data Sheet
HSR CULLEN PORTER T3N-R65W-S11 L01_0018_NORMAL	.mp4	3/18/2018	IR Camera Video Normal Operations
HSR CULLEN PORTER T3N-R65W-S11 L01_0019_DUMP	.mp4	3/18/2018	IR Camera Video During Dump Event
HSR CULLEN PORTER T3N-R65W-S11 L01_0020_POST	.mp4	3/18/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HSR CULLEN PORTER T3N-R65W-S11 L01_SIGNED EVAL	.pdf	11/8/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HSR CULLEN PORTER T3N-R65W-S11 L01\_WALK DOWN**

**Consent Decree Tank System Number:** **2203**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>20,565</b>	<b>21,578</b>	
Total VCS Capacity (scfh)	<b>24,746</b>	<b>26,178</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,238</b>	<b>21,489</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 7/20/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/16/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR CULLEN PORTER T3N-R65W-S11 L01\_WALK DOWN**

Consent Decree Tank System Number: **2203**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	827							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,885	3,720
Oil Tank Working Rate	328	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR CULLEN PORTER T3N-R65W-S11 L01\_WALK DOWN**

Consent Decree Tank System Number: **2203**

**Audit Notes**

The Work Request requested to consolidate flow lines into the HSR-Porter 9-11/HSR -Cullen 10-11 HLP Separator. This units oil dump valve is a 2" 2100 SMA. No request was made to change the dump valve size, only trim size. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01**

Consent Decree Tank System Number: **165**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_FINAL PACKET	.pdf	4/4/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	9/26/2017	STEM Engineering Evaluation Spreadsheet
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_SIGNED EVAL	.pdf	9/27/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_FINAL PACKET	.pdf	6/24/2016	Work Request
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_FINAL PACKET	.pdf	7/13/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_WALKDOWN	.pdf	2/7/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_IR VERIFICATION	.pdf	9/2/2016	IR Verification Field Data Sheet
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_1465_NORMAL	.mp4	9/2/2016	IR Camera Video Normal Operations
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_1466_DUMP	.mp4	9/2/2016	IR Camera Video During Dump Event
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_1467_POST	.mp4	9/2/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01_SIGNED EVAL	.pdf	9/27/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01**

**Consent Decree Tank System Number:** **165**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>4,006</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,953</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>793</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,746</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>901</b>	<b>952</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/4/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01**

Consent Decree Tank System Number: **165**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,454</b>	<b>3,307</b>
Oil Tank Working Rate	<b>314</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,006</b>	<b>3,845</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR CUTLER METZ SELLS UPRC T4N-R65W-S31 L01**

Consent Decree Tank System Number: **165**

### Audit Notes

A new HLP separator was brought on-site. Could not verify the oil dump valve size (2" or 1") of the new HLP separator. Conservatively assumed the valve to be 2", the largest available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KAMMERZELL BOOS T4N-R67W-S25 L01**

Consent Decree Tank System Number: **176**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_FINAL PACKET	.pdf	9/14/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	10/3/2017	STEM Engineering Evaluation Spreadsheet
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_SIGNED EVAL	.pdf	10/3/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_FINAL PACKET	.pdf	9/14/2017	Work Request
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_FINAL PACKET	.pdf	9/14/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_WALKDOWN	.pdf	9/12/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_IR VERIFICATION	.pdf	9/12/2017	IR Verification Field Data Sheet
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_4747_NORMAL	.mp4	9/12/2017	IR Camera Video Normal Operations
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_4748_DUMP	.mp4	9/12/2017	IR Camera Video During Dump Event
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_4749_POST	.mp4	9/12/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
HSR KAMMERZELL BOOS T4N-R67W-S25 L01_SIGNED EVAL	.pdf	10/3/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HSR KAMMERZELL BOOS T4N-R67W-S25 L01**

**Consent Decree Tank System Number:** **176**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,320</b>	<b>4,321</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,899</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>4,095</b>	<b>4,095</b>	
Total VCS Capacity (scfh)	<b>7,994</b>	<b>9,053</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,674</b>	<b>4,732</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 5/16/2018

Audit Document Review Verified by: Patrick Dilsaver

Audit Document Verification Date: 9/20/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KAMMERZELL BOOS T4N-R67W-S25 L01**

Consent Decree Tank System Number: **176**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,321</b>	<b>4,320</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KAMMERZELL BOOS T4N-R67W-S25 L01**

Consent Decree Tank System Number: **176**

**Audit Notes**

**Diameter of VOC Lines**

Field Datasheet (Final Packet, pg 13) show an existing 3" VOC from the tanks to the knockout.

The Job Sheet (Final Packet, pg 22) indicates a new 4" VOC above ground line was installed from the knockout to the burner. The Engineering Evaluation uses a 3" VOC line from the knockout to the burner. A larger VOC line onsite vs that which was used in the Engineering Evaluation results in an underestimation of control system capacity and therefore the Engineering Design Standard is considered strictly applied.

**Oil Dump Valve and Trim Size**

Pg 24 of the Final Packet indicates separator (SN: KM696C) was converted to a LP separator onsite. Field Datasheet (Final Packet, pg 15) shows that separator (SN: KM696C) originally had a 1" oil dump valve with a 1" trim.

No documentation is provided which indicates the 1" oil dump valve was replaced, therefore the 1" dump valve is considered currently installed on the separator. Item A1 of the STEM Walkdown Checklist is checked "yes" indicating the oil dump trim size is consistent with the Engineering Evaluation and therefore the oil dump trim size installed is 1/2".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KINZER T5N-R67W-S23 L01**

Consent Decree Tank System Number: **2092**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HSR KINZER T5N-R67W-S23 L01_FINAL PACKET	.pdf	4/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HSR KINZER T5N-R67W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	4/29/2016	STEM Engineering Evaluation Spreadsheet
HSR KINZER T5N-R67W-S23 L01_SIGNED EVAL	.pdf	5/3/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HSR KINZER T5N-R67W-S23 L01_FINAL PACKET	.pdf	4/29/2016	Work Request
HSR KINZER T5N-R67W-S23 L01_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HSR KINZER T5N-R67W-S23 L01_WALKDOWN	.pdf	4/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HSR KINZER T5N-R67W-S23 L01_IR VERIFICATION	.pdf	4/26/2016	IR Verification Field Data Sheet
HSR KINZER T5N-R67W-S23 L01_0915_NORMAL	.mp4	4/26/2016	IR Camera Video Normal Operations
HSR KINZER T5N-R67W-S23 L01_0916_DUMP	.mp4	4/26/2016	IR Camera Video During Dump Event
HSR KINZER T5N-R67W-S23 L01_0917_POST	.mp4	4/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HSR KINZER T5N-R67W-S23 L01_SIGNED EVAL	.pdf	5/3/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HSR KINZER T5N-R67W-S23 L01**

**Consent Decree Tank System Number:** **2092**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,441</b>	<b>2,442</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>762</b>	<b>762</b>	
Total VCS Capacity (scfh)	<b>3,689</b>	<b>6,595</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,248</b>	<b>4,154</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 12/18/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 1/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KINZER T5N-R67W-S23 L01**

Consent Decree Tank System Number: **2092**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.91							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	3.22							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	414							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	43.2							
Working Flow (Mscfd) <sup>h,i</sup>	4							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	1,802	1,802
Oil Tank Working Rate	164	164
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	2,442	2,441

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KINZER T5N-R67W-S23 L01**

Consent Decree Tank System Number: **2092**

**Audit Notes**

**1. Facility walkdown inconsistencies**

The Signed Walkdown (Final Packet, pg 28) indicates the tanks are banked onsite. The Site Sketch (Final Packet, pg 12) shows the tanks onsite are not banked. This appears to be a misunderstanding of "tank banking".

**2. Oil dump valve and trim size**

The Field Datasheet (Final Packet, pg 15) indicates that the existing HLP separator which remains onsite originally had a 2" oil dump valve with unknown trim size. The STEM Work Request (Final Packet, pg 3) indicates a 1" valve with a 3/8" trim was to be installed for oil dump. The Job Sheet (Final Packet, pg 22) did not mention the valve was changed. However, Item A1 of the walkdown checklist (Final Packet, pg 7) indicates the correct trim size was installed and question 1 of the walkdown checklist (Final Packet, pg 28) indicates all items in the work request were completed and serves as verification of the modified valve and trim sizes are installed onsite.

**3. Field Datasheets**

The Field Datasheets (Final Packet pg 12-17) are not dated. Assumed the date is the same as Facility Scouting date (2/22/2016).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KIRKHAM TUDOR T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2134**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_FINAL PACKET	.PDF	9/26/2016	Field Datasheet

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_SIGNED EVAL	.PDF	9/7/2016	Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_FINAL PACKET	.PDF	7/11/2016	Job Sheet
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_FINAL PACKET	.PDF	4/27/2016	STEM Work Request Form

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_WALKDOWN	.PDF	8/16/2016	Final Walkdown

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_IR VERIFICATION	.PDF	8/16/2016	IR Verification Document
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_1402_NORMAL	.MP4	8/16/2016	IR Verification Video Normal
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_1403_DUMP	.MP4	8/16/2016	IR Verification Video Dump
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_1404_POST	.MP4	8/16/2016	IR Verification Video Post

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HSR KIRKHAM TUDOR T4N-R65W-S31 L01_SIGNED EVAL	.PDF	9/7/2016	Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HSR KIRKHAM TUDOR T4N-R65W-S31 L01**

**Consent Decree Tank System Number:** **2134**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,123</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>447</b>	<b>447</b>	
Total VCS Capacity (scfh)	<b>4,570</b>	<b>5,047</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,126</b>	<b>1,602</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 11/9/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 4/13/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KIRKHAM TUDOR T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2134**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KIRKHAM TUDOR T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2134**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 21-27) are not dated. Assumed the date is the same as Facility Scouting date (4/21/2016).

**2. LP oil dump valve size not provided**

According to the job sheet (Final Packet, pg 35) a new LP separator was installed on site. No verification of the oil dump valve size was observed. The standard HP & LP separator design P&ID (Final Packet, pg 13) shows a 2" LP oil dump valve, whereas a 1" valve was used in the engineering evaluation.

Item A1 of the facility walkdown checklist (Final Packet, pg 7) confirms a 1/2" trim size. Use of the 2" valve in the engineering design does not result in an exceedence of the VCS design capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KRAUSE T4N-R65W-S28 L01**

Consent Decree Tank System Number: **368**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
HSR KRAUSE T4N-R65W-S28 L01_FINAL PACKET	.PDF	11/23/2015	Field Dataset

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
HSR KRAUSE T4N-R65W-S28 L01_SIGNED EVAL	.PDF	1/6/2017	Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
HSR KRAUSE T4N-R65W-S28 L01_FINAL PACKET	.PDF	11/23/2015	STEM Work Request Form
HSR KRAUSE T4N-R65W-S28 L01_FINAL PACKET	.PDF	11/23/2015	Job Sheet

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
HSR KRAUSE T4N-R65W-S28 L01_WALKDOWN	.PDF	11/19/2015	Walkdown

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
HSR KRAUSE T4N-R65W-S28 L01_IR VERIFICATION	.PDF	11/20/2015	IR Verification Document
HSR KRAUSE T4N-R65W-S28 L01_0456_NORMAL	.MP4	11/19/2015	IR Verification Video Normal
HSR KRAUSE T4N-R65W-S28 L01_0457_DUMP	.MP4	11/19/2015	IR Verification Video Dump
HSR KRAUSE T4N-R65W-S28 L01_0458_POST	.MP4	11/19/2015	IR Verification Video Post

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
HSR KRAUSE T4N-R65W-S28 L01_SIGNED EVAL	.PDF	1/6/2017	Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HSR KRAUSE T4N-R65W-S28 L01**

**Consent Decree Tank System Number:** **368**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,387</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>1,997</b>	<b>1,997</b>	
Total VCS Capacity (scfh)	<b>5,384</b>	<b>6,550</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,703</b>	<b>2,867</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 11/9/2017  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 9/17/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KRAUSE T4N-R65W-S28 L01**

Consent Decree Tank System Number: **368**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR KRAUSE T4N-R65W-S28 L01**

Consent Decree Tank System Number: **368**

**Audit Notes**

No confirmation within documentation verifying installation of above ground line as requested

Noble provided a response to the above discrepancy on 5/16/2018 that states "Field verification for this facility was completed on or around 10/26/2015, field verification confirmed that the 4" AGL line from KO to burner was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01**

Consent Decree Tank System Number: **157**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_FINAL PACKET	.pdf	9/26/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_STEM Eng Eval_rev1	.xlsm	9/15/2016	STEM Engineering Evaluation Spreadsheet
S20 L01_SIGNED EVAL	.pdf	9/22/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_FINAL PACKET	.pdf	9/26/2017	Work Request
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_FINAL PACKET	.pdf	9/26/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_WALKDOWN	.pdf	9/12/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_IR VERIFICATION	.pdf	9/9/2016	IR Verification Field Data Sheet
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_1486_NORMAL	.mp4	9/8/2016	IR Camera Video Normal Operations
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_1487_DUMP	.mp4	9/8/2016	IR Camera Video During Dump Event
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_1488_POST	.mp4	9/8/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01_SIGNED EVAL	.pdf	9/22/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01**

**Consent Decree Tank System Number:** **157**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,957</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,462</b>	<b>21,462</b>	
Total VCS Capacity (scfh)	<b>24,419</b>	<b>27,295</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,911</b>	<b>22,607</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 4/4/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 4/18/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01**

Consent Decree Tank System Number: **157**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR SHABLE HINDE VANDLEN PECK KRISAL T4N-R65W-S20 L01**

Consent Decree Tank System Number: **157**

**Audit Notes**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the valve size (2" or 1") of the new D-grade 300# LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR TEAGLE SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2320**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HSR TEAGLE SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/14/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HSR TEAGLE SPAYD T4N-R65W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	9/13/2017	STEM Engineering Evaluation Spreadsheet
HSR TEAGLE SPAYD T4N-R65W-S29 L01_SIGNED EVAL	.pdf	9/25/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HSR TEAGLE SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/14/2017	Work Request
HSR TEAGLE SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/14/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HSR TEAGLE SPAYD T4N-R65W-S29 L01_WALKDOWN	.pdf	9/14/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HSR TEAGLE SPAYD T4N-R65W-S29 L01_IR VERIFICATION	.pdf	3/19/2018	IR Verification Field Data Sheet
HSR TEAGLE SPAYD T4N-R65W-S29 L01_4725_NORMAL	.mp4	9/8/2017	IR Camera Video Normal Operations
HSR TEAGLE SPAYD T4N-R65W-S29 L01_4726_DUMP	.mp4	9/8/2017	IR Camera Video During Dump Event
HSR TEAGLE SPAYD T4N-R65W-S29 L01_4727_POST	.mp4	9/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HSR TEAGLE SPAYD T4N-R65W-S29 L01_SIGNED EVAL	.pdf	9/25/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR TEAGLE SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2320**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>523</b>	<b>523</b>	
Total VCS Capacity (scfh)	<b>4,550</b>	<b>5,481</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,106</b>	<b>2,037</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/26/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/26/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR TEAGLE SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2320**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

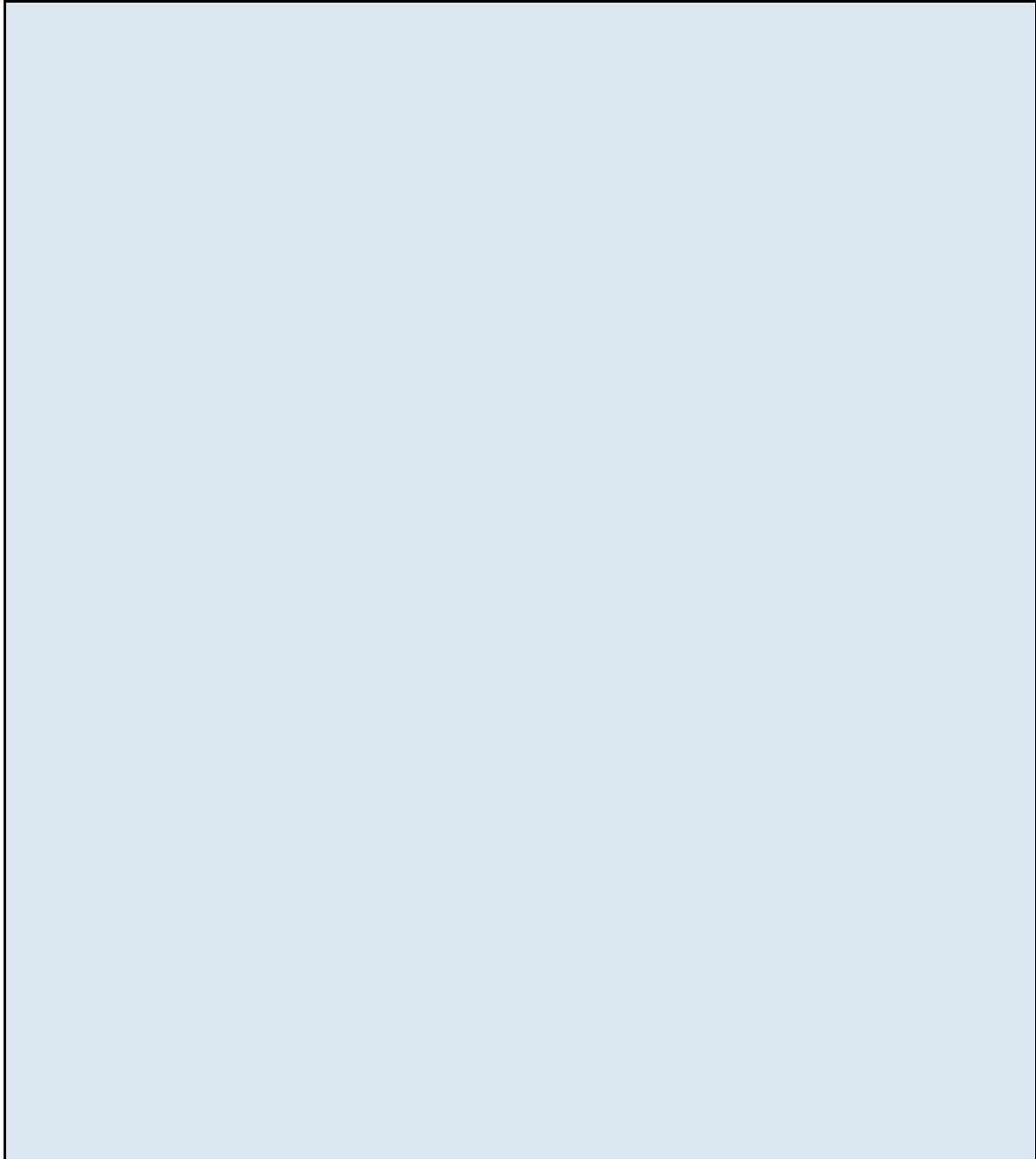
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR TEAGLE SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2320**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01

**Consent Decree Tank System Number:** 366

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_FINAL PACKET	.pdf	2/25/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	7/22/2016	STEM Engineering Evaluation Spreadsheet
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_SIGNED EVAL	.pdf	7/25/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_FINAL PACKET	.pdf	3/21/2016	Work Request
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_FINAL PACKET	.pdf	6/8/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_WALKDOWN	.pdf	7/7/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_IR VERIFICATION	.pdf	7/7/2016	IR Verification Field Data Sheet
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_1238_NORMAL	.mp4	7/6/2016	IR Camera Video Normal Operations
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_1239_DUMP	.mp4	7/6/2016	IR Camera Video During Dump Event
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_1240_POST	.mp4	7/6/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01_SIGNED EVAL	.pdf	7/25/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01**

Consent Decree Tank System Number: **366**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,587</b>	<b>21,587</b>	
Total VCS Capacity (scfh)	<b>24,514</b>	<b>27,420</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,006</b>	<b>22,911</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 11/13/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/20/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01**

Consent Decree Tank System Number: **366**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (k)	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (k)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	11	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01**

Consent Decree Tank System Number: **366**

**Audit Notes**

Field Datasheet (HSR-WILLIAMS NICHOLS RAY T4N-R65W-S32 L01\_FINAL PACKET p 12) does not specify a date but information makes sense with other documentation. Assuming Field Datasheet was completed prior to any changes on site.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HUNT T8N-R60W-S19 L01**

Consent Decree Tank System Number: **2041**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
HUNT T8N-R60W-S19 L01_FINAL PACKET	.pdf	4/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
HUNT T8N-R60W-S19 L01_STEM Engineering Evaluation_rev1	.xls	5/26/2016	STEM Engineering Evaluation Spreadsheet
HUNT T8N-R60W-S19 L01_Final Signed STEM Plan	.pdf	1/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
HUNT T8N-R60W-S19 L01_FINAL PACKET	.pdf	4/26/2016	Work Request
HUNT T8N-R60W-S19 L01_FINAL PACKET	.pdf	4/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
HUNT T8N-R60W-S19 L01_WALKDOWN	.pdf	4/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
HUNT T8N-R60W-S19 L01_IR VERIFICATION	.pdf	4/26/2016	IR Verification Field Data Sheet
HUNT T8N-R60W-S19 L01_0912_NORMAL	.mp4	4/25/2016	IR Camera Video Normal Operations
HUNT T8N-R60W-S19 L01_0913_DUMP	.mp4	4/25/2016	IR Camera Video During Dump Event
HUNT T8N-R60W-S19 L01_0914_POST	.mp4	4/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
HUNT T8N-R60W-S19 L01_SIGNED EVAL	.pdf	5/31/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HUNT T8N-R60W-S19 L01**

Consent Decree Tank System Number: **2041**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>	<b>175</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>68,933</b>	<b>68,939</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,716</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>258,012</b>	<b>258,012</b>	
Total VCS Capacity (scfh)	<b>261,728</b>	<b>262,565</b>	
VCS Capacity minus PPIVF (scfh)	<b>192,795</b>	<b>193,626</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 3/12/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HUNT T8N-R60W-S19 L01**

Consent Decree Tank System Number: **2041**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.72</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.83</b>							
Gas/Oil Ratio (scf/bbl)	<b>348.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>633</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>188</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4120</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1433.8</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>39</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>7663</b>	<b>7663</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>31</b>	<b>31</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>43</b>	<b>43</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>59,740</b>	<b>59,740</b>
Oil Tank Working Rate	<b>1,632</b>	<b>1,628</b>
Water Tank Flash Rate	<b>2,554</b>	<b>2,554</b>
Water Tank Working Rate	<b>3,586</b>	<b>3,585</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>68,939</b>	<b>68,933</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **HUNT T8N-R60W-S19 L01**

Consent Decree Tank System Number: **2041**

**Audit Notes**

The stem work request form (PG 3 of FINAL PACKET pdf) states two tanks were to be bottomed out and used for headspace however nowhere in the job sheets (PGs 21 through 24 of FINAL PACKET pdf) does it confirm this task was completed.

The final walk-down checklist also states that the tank fill lines from the LP separator can produce into all tanks (pg.7 C13)

**NOBLE RESPONSE:**

Field verification for this facility was completed on or around 4/25/2016, field verification confirmed that two tanks were bottomed out and are used as headspace.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JASMINE T7N-R63W-S21 L01**

Consent Decree Tank System Number: **1840**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
JASMINE T7N-R63W-S21 L01_FINAL PACKET	.pdf	5/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
JASMINE T7N-R63W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	10/10/2016	STEM Engineering Evaluation Spreadsheet
JASMINE T7N-R63W-S21 L01_SIGNED EVAL	.pdf	10/17/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
JASMINE T7N-R63W-S21 L01_FINAL PACKET	.pdf	5/11/2018	Work Request
JASMINE T7N-R63W-S21 L01_FINAL PACKET	.pdf	5/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
JASMINE T7N-R63W-S21 L01_WALKDOWN	.pdf	9/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
JASMINE T7N-R63W-S21 L01_IR VERIFICATION	.pdf	9/23/2016	IR Verification Field Data Sheet
JASMINE T7N-R63W-S21 L01_1522_NORMAL	.mp4	9/20/2016	IR Camera Video Normal Operations
JASMINE T7N-R63W-S21 L01_1523_DUMP	.mp4	9/20/2016	IR Camera Video During Dump Event
JASMINE T7N-R63W-S21 L01_1524_POST	.mp4	9/20/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
JASMINE T7N-R63W-S21 L01_SIGNED EVAL	.pdf	10/17/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **JASMINE T7N-R63W-S21 L01**

**Consent Decree Tank System Number:** **1840**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,436</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,813</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>243</b>	<b>243</b>	
Total VCS Capacity (scfh)	<b>3,056</b>	<b>6,076</b>	
VCS Capacity minus PPIVF (scfh)	<b>620</b>	<b>3,640</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/2/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/5/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JASMINE T7N-R63W-S21 L01**

Consent Decree Tank System Number: **1840**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>431</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>48.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

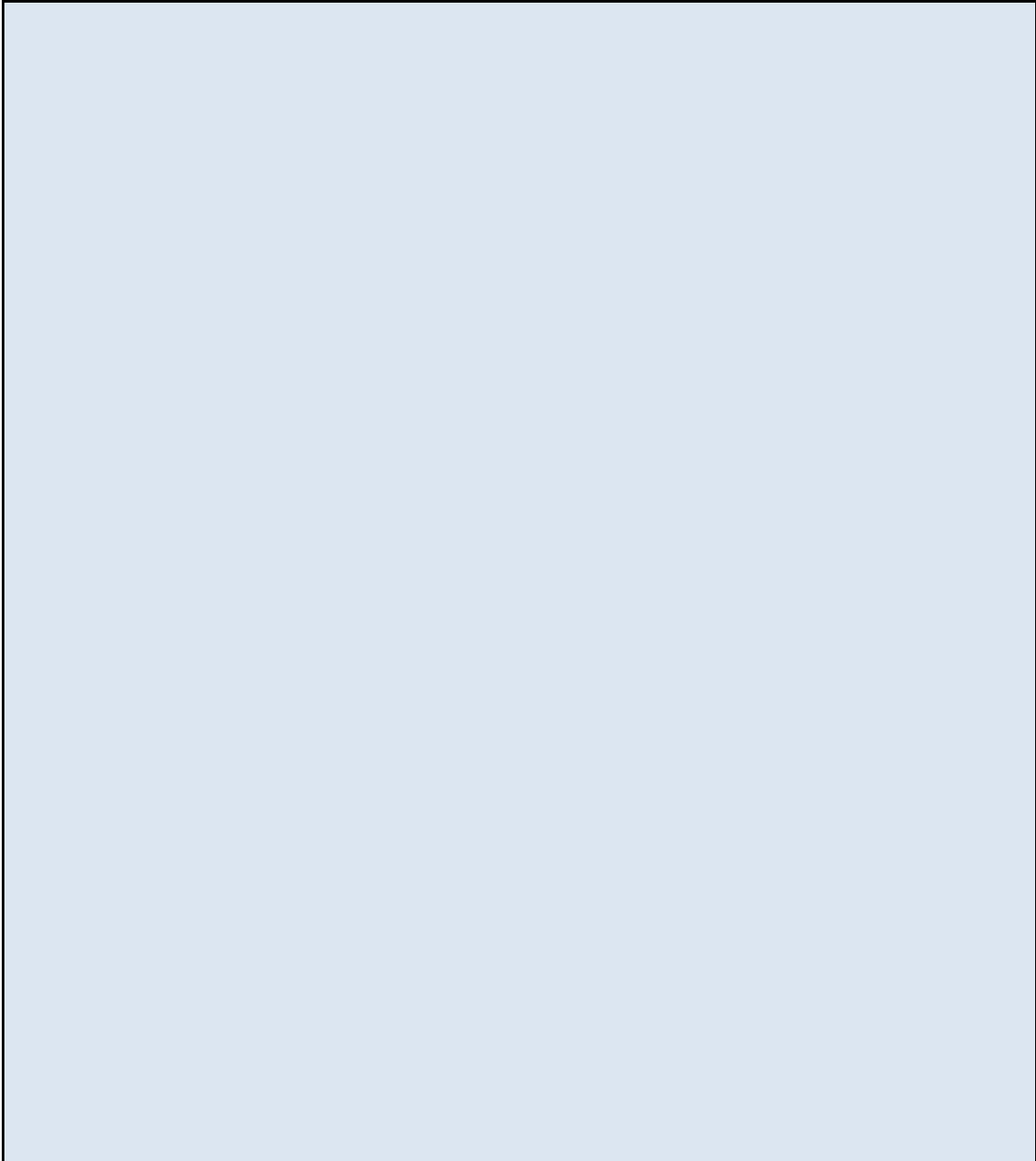
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,027</b>	<b>2,027</b>
Oil Tank Working Rate	<b>171</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,436</b>	<b>2,436</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JASMINE T7N-R63W-S21 L01**

Consent Decree Tank System Number: **1840**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JEPSEN T3N-R65W-S2 L02**

Consent Decree Tank System Number: **376**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
JEPSEN T3N-R65W-S2 L02_FINAL PACKET	.pdf	6/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
JEPSEN T3N-R65W-S2 L02_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
JEPSEN T3N-R65W-S2 L02_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
JEPSEN T3N-R65W-S2 L02_FINAL PACKET	.pdf	6/16/2016	Work Request
JEPSEN T3N-R65W-S2 L02_FINAL PACKET	.pdf	6/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
JEPSEN T3N-R65W-S2 L02_WALKDOWN	.pdf	6/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
JEPSEN T3N-R65W-S2 L02_IR VERIFICATION	.pdf	6/14/2016	IR Verification Field Data Sheet
JEPSEN T3N-R65W-S2 L02_1120_NORMAL	.mp4	6/8/2016	IR Camera Video Normal Operations
JEPSEN T3N-R65W-S2 L02_1121_DUMP	.mp4	6/8/2016	IR Camera Video During Dump Event
JEPSEN T3N-R65W-S2 L02_1122_POST	.mp4	6/8/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
JEPSEN T3N-R65W-S2 L02_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** JEPSEN T3N-R65W-S2 L02

**Consent Decree Tank System Number:** 376

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,388</b>	<b>21,388</b>	
Total VCS Capacity (scfh)	<b>24,315</b>	<b>27,221</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,807</b>	<b>22,712</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/13/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/5/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JEPSEN T3N-R65W-S2 L02**

Consent Decree Tank System Number: **376**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** JEPSEN T3N-R65W-S2 L02

**Consent Decree Tank System Number:** 376

**Audit Notes**

The walkdown checklist (JEPSEN T3N-R65W-S2 L02\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (JEPSEN T3N-R65W-S2 L02\_FINAL PACKET).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOANN T5N-R65W-S22 L01**

Consent Decree Tank System Number: **1236**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
JOANN T5N-R65W-S22 L01_FINAL PACKET	.pdf	11/10/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
JOANN T5N-R65W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	11/11/2016	STEM Engineering Evaluation Spreadsheet
JOANN T5N-R65W-S22 L01_SIGNED EVAL	.pdf	11/15/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
JOANN T5N-R65W-S22 L01_FINAL PACKET	.pdf	11/10/2016	Work Request
JOANN T5N-R65W-S22 L01_FINAL PACKET	.pdf	11/10/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
JOANN T5N-R65W-S22 L01_WALKDOWN	.pdf	11/8/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
JOANN T5N-R65W-S22 L01_IR VERIFICATION	.pdf	11/3/2016	IR Verification Field Data Sheet
JOANN T5N-R65W-S22 L01_1041_NORMAL	.mp4	11/2/2016	IR Camera Video Normal Operations
JOANN T5N-R65W-S22 L01_1042_DUMP	.mp4	11/2/2016	IR Camera Video During Dump Event
JOANN T5N-R65W-S22 L01_1043_POST	.mp4	11/2/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
JOANN T5N-R65W-S22 L01_Final Signed STEM Plan	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **JOANN T5N-R65W-S22 L01**

**Consent Decree Tank System Number:** **1236**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>706</b>	<b>706</b>	
Total VCS Capacity (scfh)	<b>4,372</b>	<b>5,664</b>	
VCS Capacity minus PPIVF (scfh)	<b>928</b>	<b>2,220</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 11/13/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 11/15/2017





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOANN T5N-R65W-S22 L01**

Consent Decree Tank System Number: **1236**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOANN T5N-R65W-S22 L01**

Consent Decree Tank System Number: **1236**

**Audit Notes**

The IR videos in the folder (1041, 1042, 1043) do not correspond to IR verification PDF (1038, 1039, 1040). However, site names at the end of the mp4 matched the name of the site.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01**

Consent Decree Tank System Number: **652**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_FINAL PACKET	.pdf	11/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	12/21/2017	STEM Engineering Evaluation Spreadsheet
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_FINAL PACKET	.pdf	11/26/2016	Work Request
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_FINAL PACKET	.pdf	11/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_0845_NORMAL	.mp4	4/11/2016	IR Camera Video Normal Operations
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_0846_DUMP	.mp4	4/11/2016	IR Camera Video During Dump Event
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_0847_POST	.mp4	4/11/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01

**Consent Decree Tank System Number:** 652

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>275</b>	<b>300</b>	<b>300</b>	<b>300</b>	<b>400</b>	<b>70</b>		
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>2</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>23,305</b>	<b>23,374</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>9,101</b>	<b>13,706</b>	
Headspace Surge Capacity (scfh)	<b>78,915</b>	<b>78,915</b>	
Total VCS Capacity (scfh)	<b>88,016</b>	<b>92,621</b>	
VCS Capacity minus PPIVF (scfh)	<b>64,711</b>	<b>69,247</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/20/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/30/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01**

Consent Decree Tank System Number: **652**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94	0.94	0.94	0.78	0.94		
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72	5.72	5.72	7.20	5.72		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	No		
Peak Flow (bwpd) <sup>f,g</sup>	3121	3254	3254	3254	3906	1641		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	12	13	13	13	16	7		
Working Flow (Mscfd) <sup>l</sup>	18	18	18	18	22	9		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	23	6

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	3,072	3,044
Water Tank Working Rate	4,312	4,272
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	2,527	2,527
Total	23,374	23,305

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01**

Consent Decree Tank System Number: **652**

**Audit Notes**

The walkdown checklist (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_FINAL PACKET).

According to the field datasheet (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_FINAL PACKET, p 15) the 300 bbl water tanks is not connected to the VOC system. This contradicts both the model (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_STEM Engineering Evaluation\_rev1\_with TLO), the signed eval (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_SIGNED EVAL), and the job sheet (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_FINAL PACKET, p 22). The modeling guideline is still strictly followed because the PPIVF is either overestimated or accurately estimated.

As per the field data sheet (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_FINAL PACKET, p 17), there are 3 different combustors on site, a Tornado, Cimarron 48", and Cimarron 48" HV. The model accounts for the two Cimarron combustors both as just Cimarron 48" HV's (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_STEM Engineering Evaluation\_rev1\_with TLO) . A new model was created to showcase these changes (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_STEM E\_Eval\_rev2\_RA\_TLO). The data request response from 8/15/2018 stated "There are 3 burners located at the facility, one Tornado and two Cimarrons 48 HVs. This is consistent with the engineering evaluation. Field verification for this facility was completed on or around 9/2/16, field verification for this facility confirmed that there are three burners on site." This confirms that the two Cimarron burners on site are 48" HVs.

The water dump valve on the HP separator associated with the MARK ALTER C16-79HN well is 2" in size according to the field datasheets (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_FINAL PACKET, p 16). The STEM engineering evaluation (JOHNSON MARK ALTER AMANDA ZANE T4N-R64W-S9 L01\_STEM Engineering Evaluation\_rev1\_with TLO) was completed with this separator having a 1" water dump valve. The work request and job sheets do not request to reduce the size of the water dump valve on this separator. As a result water flash gas and working losses are underestimated and the modeling guideline was not strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOHNSON T4N-R65W-S12 L01**

Consent Decree Tank System Number: **624**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
JOHNSON T4N-R65W-S12 L01_FINAL PACKET	.pdf	6/29/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
JOHNSON T4N-R65W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	7/18/2016	STEM Engineering Evaluation Spreadsheet
JOHNSON T4N-R65W-S12 L01_SIGNED EVAL	.pdf	7/19/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
JOHNSON T4N-R65W-S12 L01_FINAL PACKET	.pdf	6/29/2016	Work Request
JOHNSON T4N-R65W-S12 L01_FINAL PACKET	.pdf	6/29/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
JOHNSON T4N-R65W-S12 L01_WALKDOWN	.pdf	6/26/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
JOHNSON T4N-R65W-S12 L01_IR VERIFICATION	.pdf	6/29/2016	IR Verification Field Data Sheet
JOHNSON T4N-R65W-S12 L01_1215_NORMAL	.mp4	6/28/2016	IR Camera Video Normal Operations
JOHNSON T4N-R65W-S12 L01_1216_DUMP	.mp4	6/28/2016	IR Camera Video During Dump Event
JOHNSON T4N-R65W-S12 L01_1217_POST	.mp4	6/28/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
JOHNSON T4N-R65W-S12 L01_SIGNED EVAL	.pdf	7/19/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **JOHNSON T4N-R65W-S12 L01**

**Consent Decree Tank System Number:** **624**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,462</b>	<b>13,464</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,893</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>25,366</b>	<b>25,366</b>	
Total VCS Capacity (scfh)	<b>29,259</b>	<b>34,566</b>	
VCS Capacity minus PPIVF (scfh)	<b>15,797</b>	<b>21,102</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/15/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/15/2017





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOHNSON T4N-R65W-S12 L01**

Consent Decree Tank System Number: **624**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>13,464</b>	<b>13,462</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JOHNSON T4N-R65W-S12 L01**

Consent Decree Tank System Number: **624**

**Audit Notes**

Separator 12-22 was converted to LP separator it has a 1400 SMA (1" valve) with a 1" trim. Signed evaluation is utilizing a 2" valve with a 1" trim.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JONES T7N-R63W-S5 L01**

Consent Decree Tank System Number: **2004**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S5 L01_Final Signed STEM Plan_Oil	.pdf	5/16/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S5 L01_STEM Engineering Evaluation_rev1_Oil	.xlsm	3/14/2018	STEM Engineering Evaluation Spreadsheet
JONES T7N-R63W-S5 L01_SIGNED EVAL_OIL	.pdf	4/13/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S5 L01_Final Signed STEM Plan_Oil	.pdf	5/16/2018	Work Request
JONES T7N-R63W-S5 L01_Final Signed STEM Plan_Oil	.pdf	5/16/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S5 L01_WALKDOWN	.pdf	4/7/2017	Final Facility Walkdown Checklist
2018 Draft Attachements to Comment Letter	.pdf	3/27/2020	Supplimental Walk Down Document

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S5 L01_IR VERIFICATION	.pdf	4/7/2017	IR Verification Field Data Sheet
JONES T7N-R63W-S5 L01_1940_NORMAL	.mp4	4/4/2017	IR Camera Video Normal Operations
JONES T7N-R63W-S5 L01_1941_DUMP	.mp4	4/4/2017	IR Camera Video During Dump Event
JONES T7N-R63W-S5 L01_1942_POST	.mp4	4/4/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S5 L01_WALKDOJONES T7N-R63W-S5 L01_SIGNED EVAL_OIL	.pdf	4/13/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** JONES T7N-R63W-S5 L01

**Consent Decree Tank System Number:** 2004

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>270</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>50,485</b>	<b>52,680</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,717</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>96,857</b>	<b>96,857</b>	
Total VCS Capacity (scfh)	<b>100,574</b>	<b>101,410</b>	
VCS Capacity minus PPIVF (scfh)	<b>50,089</b>	<b>48,730</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 7/19/2018  
 Audit Document Review Verified by: Angela M. Oberlander & James Van Horne  
 Audit Document Verification Date: 12/17/2018 & 8/17/2020



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JONES T7N-R63W-S5 L01**

Consent Decree Tank System Number: **2004**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>2.10</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>2.22</b>							
Gas/Oil Ratio (scf/bbl)	<b>663.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>717</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>283</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.78</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1838</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1218.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>17</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>50,763</b>	<b>48,601</b>
Oil Tank Working Rate	<b>728</b>	<b>695</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>52,680</b>	<b>50,485</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JONES T7N-R63W-S5 L01**

Consent Decree Tank System Number: **2004**

**Audit Notes**

The Work Request indicated the oil and water dump valves on Separators 1 & 2 were to be modified to 1/2 inch trims. The oil and water dump valves were indicated at 2" valves for all. Evaluation was completed with a 1" oil valve on the LP Separator. Could not verify the oil dump valve size (2" or 1") on the LP separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

An initial Work Request dated 10/18/2016, requested a single tank be disconnected from the fill header and utilized as a headspace only tank. The accompanying Job Sheet, dated 3/3/17, did not confirm the requested modification was completed. The Walkdown Checklist, dated 4/4/17, item C13 indicated the LP Separator could produce to all tanks. A second Work Request, issued 3/14/18, requested another tank be disconnected from the fill header and utilized as a headspace only tank. There is no accompanying Job Sheet for this request. The assumed (non-dated) Walkdown Checklist for the second Work Request had item C14, "Are tank fill lines configured to enable LP Separator(s) to produce into all tanks?", marked as NA. Information initially provided does not confirm two tanks were disconnected from fill to be used as headspace tanks only.

Noble provided information on 11/14/2018 indicating "Rework was completed on or around 4/11/2018, in the final packet, JONES T7N-R63W-S5 L01\_FINAL PACKET, submitted with the File Delivery May 22, 2018, pages 31-34 include documentation of the completed rework, specifically the signatures and completed walkdown provide documentation that the second work request was completed and that the second headspace tank was created." The signatures on page 31 of the JONES T7N-R63W-S5 L01\_FINAL PACKET do not have further description as to what they signify (issuance or the work order, completion of the work order, etc.) and the walkdown checklist does not specifically address headspace tanks. Additional information was provided in a letter date 3/27/2020 in which Noble stated "The number of headspace tanks was field verified on April 23, 2019."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** JONES T7N-R63W-S6 L01  
**Consent Decree Tank System Number:** 1993

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S6 L01_FINAL PACKET	.pdf	7/11/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S6 L01_STEM Engineering Evaluation_rev1_Oil	.xlsm	7/22/2016	STEM Engineering Evaluation Spreadsheet
JONES T7N-R63W-S6 L01_SIGNED EVAL_OIL	.pdf	7/26/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S6 L01_FINAL PACKET	.pdf	7/11/2016	Work Request
JONES T7N-R63W-S6 L01_FINAL PACKET	.pdf	7/11/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S6 L01_WALKDOWN	.pdf	7/11/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S6 L01_IR VERIFICATION	.pdf	7/11/2016	IR Verification Field Data Sheet
JONES T7N-R63W-S6 L01_1263_NORMAL	.mp4	7/8/2016	IR Camera Video Normal Operations
JONES T7N-R63W-S6 L01_1264_DUMP	.mp4	7/8/2016	IR Camera Video During Dump Event
JONES T7N-R63W-S6 L01_1265_POST	.mp4	7/8/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
JONES T7N-R63W-S6 L01_SIGNED EVAL_OIL	.pdf	7/26/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **JONES T7N-R63W-S6 L01**

**Consent Decree Tank System Number:** **1993**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>21,355</b>	<b>21,356</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,856</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>44,520</b>	<b>44,520</b>	
Total VCS Capacity (scfh)	<b>50,376</b>	<b>54,906</b>	
VCS Capacity minus PPIVF (scfh)	<b>29,021</b>	<b>33,550</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser

Audit Document Review Date: 12/11/2018

Audit Document Review Verified by: Angela M. Oberlander

Audit Document Verification Date: 12/18/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JONES T7N-R63W-S6 L01**

Consent Decree Tank System Number: **1993**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.72</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.83</b>							
Gas/Oil Ratio (scf/bbl)	<b>348.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>633</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>188</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1354</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>471.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>13</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>19,631</b>	<b>19,631</b>
Oil Tank Working Rate	<b>536</b>	<b>535</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>21,356</b>	<b>21,355</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **JONES T7N-R63W-S6 L01**

Consent Decree Tank System Number: **1993**

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "NA" making it indeterminate whether the LP separator could produce into all tanks.

Noble provided information on 12/10/2018 indicating a "Field verification for this facility was completed on or around 6/23/2016, field verification confirmed that one tank was converted to a headspace tank." The Engineering Design Standard has been appropriately applied based on the provided field verification information.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KANGA STATE T3N-R64W-S36 L01**

Consent Decree Tank System Number: **1329**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
KANGA STATE T3N-R64W-S36 L01_FINAL PACKET	.pdf	1/16/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
KANGA STATE T3N-R64W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	1/17/2017	STEM Engineering Evaluation Spreadsheet
KANGA STATE T3N-R64W-S36 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
KANGA STATE T3N-R64W-S36 L01_FINAL PACKET	.pdf	1/16/2017	Work Request
KANGA STATE T3N-R64W-S36 L01_FINAL PACKET	.pdf	1/16/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
KANGA STATE T3N-R64W-S36 L01_WALKDOWN	.pdf	1/16/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
KANGA STATE T3N-R64W-S36 L01_IR VERIFICATION	.pdf	1/16/2017	IR Verification Field Data Sheet
KANGA STATE T3N-R64W-S36 L01_0016_NORMAL	.mp4	1/12/2017	IR Camera Video Normal Operations
KANGA STATE T3N-R64W-S36 L01_0017_DUMP	.mp4	1/12/2017	IR Camera Video During Dump Event
KANGA STATE T3N-R64W-S36 L01_0018_POST	.mp4	1/12/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
KANGA STATE T3N-R64W-S36 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KANGA STATE T3N-R64W-S36 L01**

Consent Decree Tank System Number: **1329**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>453</b>	<b>453</b>	
Total VCS Capacity (scfh)	<b>4,119</b>	<b>5,411</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,051</b>	<b>2,217</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/19/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/6/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KANGA STATE T3N-R64W-S36 L01**

Consent Decree Tank System Number: **1329**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio (F <sub>p</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	725							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	64.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>p</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	6	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,670	2,556
Oil Tank Working Rate	287	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KANGA STATE T3N-R64W-S36 L01**

Consent Decree Tank System Number: **1329**

**Audit Notes**

The Walk down checklist not marked as being completed. The site was verified through other supplied documentation. (KANGA STATE T3N-R64W-S36 L01\_WALKDOWN pg. 4 )

Per the Work Request (KANGA STATE T3N-R64W-S36 L01\_FINAL PACKET.pdf, pg. 3) existing LP oil dump valve and trim should be replaced with a 1" valve and 1/2" trim. The Job Sheet (KANGA STATE T3N-R64W-S36 L01\_FINAL PACKET.pdf, pg 19) confirms trim and valve were installed, but the sizes were not verified. The walkdown checklist (KANGA STATE T3N-R64W-S36 L01\_WALKDOWN,p 1) item A1 confirms the trim sizes (1/2") on the signed eval (FOSS T6N-R63W-S6 L02\_SIGNED EVAL, p 2) are correct. There was no confirmation that the valve size was changed from the original 2" size. A 2" valve was used in these calculations to be conservative. It is unknown if the modeling guideline was strictly followed for the tank system.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

This site was selected for an additional IR camera inspection to inspect a possible leak along the VCS line.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** KARAKAKES T3N-R65W-S13 L02

**Consent Decree Tank System Number:** 2009

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KARAKAKES T3N-R65W-S13 L02_FINAL PACKET	.pdf	9/8/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KARAKAKES T3N-R65W-S13 L02_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/13/2017	STEM Engineering Evaluation Spreadsheet
KARAKAKES T3N-R65W-S13 L02_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation
104-105_KARAKAKES T3N-R65W-S13 L02_STEM Engineering Evaluation_rev1_with TLO_correction	.xlsm	8/15/2018	Updated STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
KARAKAKES T3N-R65W-S13 L02_FINAL PACKET	.pdf	9/8/2017	Work Request
KARAKAKES T3N-R65W-S13 L02_FINAL PACKET	.pdf	9/8/2017	Construction Jobsheets
104-105_KARAKAKES T3N-R65W-S13 L02_Final Signed STEM Plan2	.pdf	8/15/2018	Updated Final Signed Engineering Evaluation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KARAKAKES T3N-R65W-S13 L02_WALKDOWN	.pdf	10/5/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KARAKAKES T3N-R65W-S13 L02_IR VERIFICATION	.pdf	10/4/2016	IR Verification Field Data Sheet
KARAKAKES T3N-R65W-S13 L02_1548_NORMAL	.mp4	9/27/2016	IR Camera Video Normal Operations
KARAKAKES T3N-R65W-S13 L02_1549_DUMP	.mp4	9/27/2016	IR Camera Video During Dump Event
KARAKAKES T3N-R65W-S13 L02_1550_POST	.mp4	9/27/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KARAKAKES T3N-R65W-S13 L02_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation
104-105_KARAKAKES T3N-R65W-S13 L02_SIGNED EVAL_rev	.pdf	9/27/2016	Updated Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KARAKAKES T3N-R65W-S13 L02**

Consent Decree Tank System Number: **2009**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>22,340</b>	<b>22,342</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>80,847</b>	<b>80,847</b>	
Total VCS Capacity (scfh)	<b>84,610</b>	<b>85,400</b>	
VCS Capacity minus PPIVF (scfh)	<b>62,270</b>	<b>63,058</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/9/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KARAKAKES T3N-R65W-S13 L02**

Consent Decree Tank System Number: **2009**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>11381</b>	<b>5068</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>46</b>	<b>20</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>64</b>	<b>28</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>17</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>2,741</b>	<b>2,741</b>
Water Tank Working Rate	<b>3,848</b>	<b>3,848</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>22,342</b>	<b>22,340</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KARAKAKES T3N-R65W-S13 L02**

Consent Decree Tank System Number: **2009**

**Audit Notes**

Modeling was completed with one tank utilized as headspace, removed from liquid service. The signed evaluation utilizes a 60% Certification Max (one tank in vapor service, three tanks 80% full), while the STEM model used a 68% max (one tank in vapor service, three tanks 90% full). Need to verify whether the tanks are operated at 60% or 68% liquid level.

STEM modeling file used 400 psig maximum operating pressure on the HP separator. The signed evaluation utilized a 500 psig maximum operating pressure for the HP Separator. Need to verify the correct maximum operating pressure to correctly determine the water dump impact.

Noble Response- 'The Engineering Evaluation has been updated to reflect that the tanks are operating at 68% liquid level. As such, the Engineering Evaluation submitted with File Delivery Oct 31, 2017 has been updated and is being provided with this 3rd Request Response as documents: (1) 104-105\_KARAKAKES T3N-R65W-S13 L02\_Final Signed STEM Plan2 , (2) 104-105\_KARAKAKES T3N-R65W-S13 L02\_SIGNED EVAL\_rev , and (3) 104-105\_KARAKAKES T3N-R65W-S13 L02\_STEM Engineering Evaluation\_rev1\_with TLO\_correction.

Noble Response- 'The Signed Engineering Evaluation has been updated to reflect that the separator pressure is designed at 400 psig. As such, the Engineering Evaluation submitted with File Delivery Oct 31, 2017 has been updated and is being provided with this 3rd Request Response as documents: (1) 104-105\_KARAKAKES T3N-R65W-S13 L02\_Final Signed STEM Plan2, (2) 104-105\_KARAKAKES T3N-R65W-S13 L02\_SIGNED EVAL\_rev, and (3) 104-105\_KARAKAKES T3N-R65W-S13 L02\_STEM Engineering Evaluation\_rev1\_with TLO\_correction.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KARCH BLUE GUTTERSEN T3N-R64W-S12 L01**

Consent Decree Tank System Number: **541**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_FINAL PACKET	.pdf	6/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_FINAL PACKET	.pdf	6/16/2016	Work Request
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_FINAL PACKET	.pdf	6/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_WALKDOWN	.pdf	6/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_IR VERIFICATION	.pdf	6/14/2016	IR Verification Field Data Sheet
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_1102_NORMAL	.mp4	6/7/2016	IR Camera Video Normal Operations
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_1103_DUMP	.mp4	6/7/2016	IR Camera Video During Dump Event
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_1104_POST	.mp4	6/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KARCH BLUE GUTTERSEN T3N-R64W-S12 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KARCH BLUE GUTTERSEN T3N-R64W-S12 L01**

**Consent Decree Tank System Number:** **541**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,926</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,646</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>22,807</b>	<b>22,807</b>	
Total VCS Capacity (scfh)	<b>25,453</b>	<b>28,640</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,707</b>	<b>23,714</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 3/9/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KARCH BLUE GUTTERSEN T3N-R64W-S12 L01**

Consent Decree Tank System Number: **541**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KARCH BLUE GUTTERSEN T3N-R64W-S12 L01**

Consent Decree Tank System Number: **541**

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "NA" making it ambiguous as to whether the tank was placed in vapor headspace use.

NEI Data Request Respose:

Field verification for this facility was completed on or around 5/24/16, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).

The Work Request indicated the oil dump valve on HLP Separator was to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KATE WHITE JESSIE T3N-R64W-S29 L01**

Consent Decree Tank System Number: **1120**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
KATE WHITE JESSIE T3N-R64W-S29 L01_FINAL PACKET_REWORK	.pdf	9/25/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
KATE WHITE JESSIE T3N-R64W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	6/15/2017	STEM Engineering Evaluation Spreadsheet
KATE WHITE JESSIE T3N-R64W-S29 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
KATE WHITE JESSIE T3N-R64W-S29 L01_FINAL PACKET_REWORK	.pdf	9/25/2017	Work Request
066_KATE WHITE JESSIE T3N-R64W-S29 L01 COMPLETED REWORK	.pdf	5/18/2018	Rework Request
KATE WHITE JESSIE T3N-R64W-S29 L01_FINAL PACKET_REWORK	.pdf	9/25/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
KATE WHITE JESSIE T3N-R64W-S29 L01_WALKDOWN	.pdf	1/25/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
KATE WHITE JESSIE T3N-R64W-S29 L01_IR VERIFICATION	.pdf	1/22/2016	IR Verification Field Data Sheet
KATE WHITE JESSIE T3N-R64W-S29 L01_0608_NORMAL	.mp4	1/21/2016	IR Camera Video Normal Operations
KATE WHITE JESSIE T3N-R64W-S29 L01_0609_DUMP	.mp4	1/21/2016	IR Camera Video During Dump Event
KATE WHITE JESSIE T3N-R64W-S29 L01_0610_POST	.mp4	1/21/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
KATE WHITE JESSIE T3N-R64W-S29 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KATE WHITE JESSIE T3N-R64W-S29 L01**

Consent Decree Tank System Number: **1120**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,006</b>	<b>4,006</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>929</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,595</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>589</b>	<b>952</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KATE WHITE JESSIE T3N-R64W-S29 L01**

Consent Decree Tank System Number: **1120**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,454</b>	<b>3,454</b>
Oil Tank Working Rate	<b>314</b>	<b>314</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,006</b>	<b>4,006</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KATE WHITE JESSIE T3N-R64W-S29 L01**

Consent Decree Tank System Number: **1120**

**Audit Notes**

The separator on location has pressure controlled by a pneumatic controller. The provided documentation shows that the controller shut-in pressure was set to 70 psig as requested in the STEM Work Request dated 7/21/2015. The signed Engineering Evaluation was completed with a shut-in pressure of 65 psig. Requested confirmation of separator shut-in pressure.

NEI Data Request Response:

Rework reduced the LP separator max pressure to 65 psig. The completed rework is being provided in this 2nd Information Request Response titled 066\_KATE WHITE JESSIE T3N-R64W-S29 L01 COMPLETED REWORK which provides confirmation that the separator control pressure was set as requested.

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KAUFMAN T4N-R65W-S8 L01**

Consent Decree Tank System Number: **958**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KAUFMAN T4N-R65W-S8 L01_FINAL PACKET	.pdf	Unknown	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KAUFMAN T4N-R65W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	4/26/2017	STEM Engineering Evaluation Spreadsheet
KAUFMAN T4N-R65W-S8 L01_SIGNED EVAL	.pdf	4/27/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KAUFMAN T4N-R65W-S8 L01_FINAL PACKET	.pdf	9/6/2016	Work Request
KAUFMAN T4N-R65W-S8 L01_FINAL PACKET	.pdf	3/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KAUFMAN T4N-R65W-S8 L01_WALKDOWN	.pdf	4/25/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KAUFMAN T4N-R65W-S8 L01_IR VERIFICATION	.pdf	4/25/2017	IR Verification Field Data Sheet
KAUFMAN T4N-R65W-S8 L01_1981_NORMAL	.mp4	4/24/2017	IR Camera Video Normal Operations
KAUFMAN T4N-R65W-S8 L01_1982_DUMP	.mp4	4/24/2017	IR Camera Video During Dump Event
KAUFMAN T4N-R65W-S8 L01_1983_POST	.mp4	4/24/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KAUFMAN T4N-R65W-S8 L01_SIGNED EVAL	.pdf	4/27/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KAUFMAN T4N-R65W-S8 L01**

Consent Decree Tank System Number: **958**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,769</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>637</b>	<b>637</b>	
Total VCS Capacity (scfh)	<b>4,406</b>	<b>5,237</b>	
VCS Capacity minus PPIVF (scfh)	<b>962</b>	<b>1,650</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 3/22/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 4/2/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KAUFMAN T4N-R65W-S8 L01**

Consent Decree Tank System Number: **958**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	3,587	3,444
-------	-------	-------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KAUFMAN T4N-R65W-S8 L01**

Consent Decree Tank System Number: **958**

**Audit Notes**

Field Datasheet (KAUFMAN T4N-R65W-S8 L01\_FINAL PACKET p 12) does not specify a date but information makes sense with other documentation. No date listed for Facility Scouting at the beginning of the Final Packet either. Assuming Field Datasheet was completed prior to any changes on site.

Work Request (KAUFMAN T4N-R65W-S8 L01\_FINAL PACKET, p 4) asks for the 2" oil dump valve to be replaced with a 1400, 1/2" trim. Cannot confirm this task was completed with existing documentation. Conservatively assumed 2" valve is still installed.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEELY MAX T5N-R64W-S10 L01**

Consent Decree Tank System Number: **299**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KEELY MAX T5N-R64W-S10 L01_FINAL PACKET	.pdf	9/11/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KEELY MAX T5N-R64W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
KEELY MAX T5N-R64W-S10 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KEELY MAX T5N-R64W-S10 L01_FINAL PACKET	.pdf	9/11/2015	Work Request
KEELY MAX T5N-R64W-S10 L01_FINAL PACKET	.pdf	9/11/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KEELY MAX T5N-R64W-S10 L01_WALKDOWN	.pdf	9/11/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
BOCKIUS PFANNEBECKER T4N-R64W-S15 L01_IR VERIFICATION	.pdf	9/10/2015	IR Verification Field Data Sheet
KEELY MAX T5N-R64W-S10 L01_0247_NORMAL	.mp4	9/8/2015	IR Camera Video Normal Operations
KEELY MAX T5N-R64W-S10 L01_0248_DUMP	.mp4	9/8/2015	IR Camera Video During Dump Event
KEELY MAX T5N-R64W-S10 L01_0249_POST	.mp4	9/8/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KEELY MAX T5N-R64W-S10 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEELY MAX T5N-R64W-S10 L01**

Consent Decree Tank System Number: **299**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>70</b>	<b>70</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>				

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>23,593</b>	<b>23,596</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,073</b>	<b>9,106</b>	
Headspace Surge Capacity (scfh)	<b>26,698</b>	<b>26,698</b>	
Total VCS Capacity (scfh)	<b>33,771</b>	<b>35,804</b>	
VCS Capacity minus PPIVF (scfh)	<b>10,178</b>	<b>12,208</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/5/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/24/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEELY MAX T5N-R64W-S10 L01**

Consent Decree Tank System Number: **299**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.80	0.80						
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20	12.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	1437	1437						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	162.1	162.1						
Working Flow (Mscfd) <sup>h,i</sup>	14	14						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78	0.78				
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20	7.20				
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200				
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bwpd) <sup>f,g</sup>	3906	3906	1739	1739				

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	16	16	7	7				
Working Flow (Mscfd) <sup>l</sup>	22	22	10	10				

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	34	11

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	13,505	13,505
Oil Tank Working Rate	1,139	1,136
Water Tank Flash Rate	1,882	1,882
Water Tank Working Rate	2,642	2,641
Tank Breathing Rate	1,902	1,902
Truck Loading Vapor	2,527	2,527
Total	23,596	23,593

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEELY MAX T5N-R64W-S10 L01**

Consent Decree Tank System Number: **299**

**Audit Notes**

[Empty box for Audit Notes]

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEHN USX T7N-R63W-S35 L01**

Consent Decree Tank System Number: **1523**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KEHN USX T7N-R63W-S35 L01_REWORK	.pdf	11/14/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KEHN USX T7N-R63W-S35 L01_STEM Engineering Evaluation_rev1_Rework 3	.xls	11/14/2018	STEM Engineering Evaluation Spreadsheet
KEHN USX T7N-R63W-S35 L01_SIGNED EVAL_REV	.pdf	11/14/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KEHN USX T7N-R63W-S35 L01_REWORK	.pdf	11/14/2018	Work Request
KEHN USX T7N-R63W-S35 L01_REWORK	.pdf	11/14/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KEHN USX T7N-R63W-S35 L01_WALKDOWN	.pdf	2/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KEHN USX T7N-R63W-S35 L01_IR VERIFICATION	.pdf	2/26/2016	IR Verification Field Data Sheet
KEHN USX T7N-R63W-S35 L01_0103_NORMAL	.pdf	2/25/2016	IR Camera Video Normal Operations
KEHN USX T7N-R63W-S35 L01_0104_DUMP	.pdf	2/25/2016	IR Camera Video During Dump Event
KEHN USX T7N-R63W-S35 L01_0105_POST	.pdf	2/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KEHN USX T7N-R63W-S35 L01_SIGNED EVAL_REV	.pdf	11/14/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEHN USX T7N-R63W-S35 L01**

Consent Decree Tank System Number: **1523**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,310</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>354</b>	<b>354</b>	
Total VCS Capacity (scfh)	<b>4,664</b>	<b>4,954</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,220</b>	<b>1,509</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/25/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEHN USX T7N-R63W-S35 L01**

Consent Decree Tank System Number: **1523**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

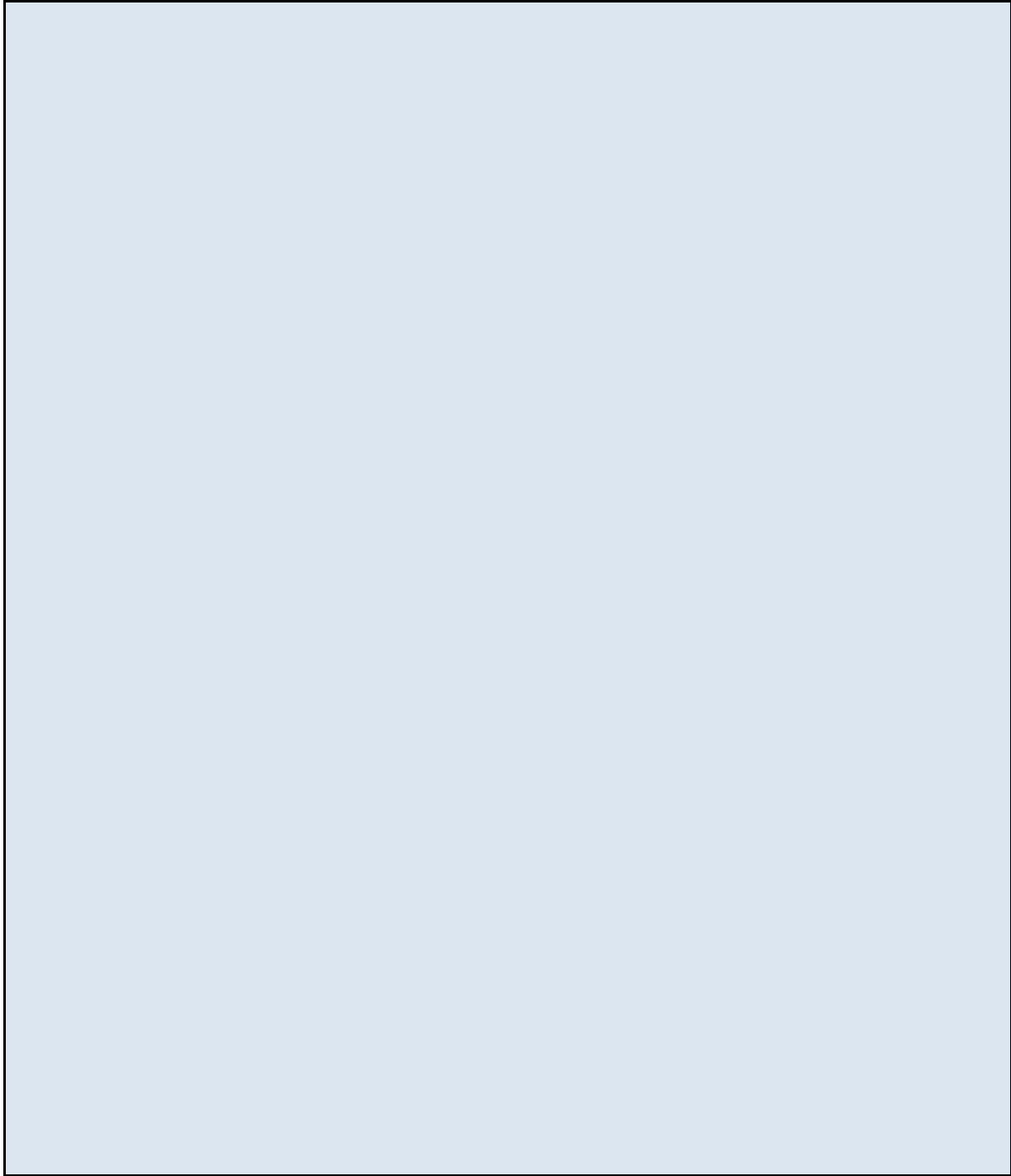
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEHN USX T7N-R63W-S35 L01**

Consent Decree Tank System Number: **1523**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01**

Consent Decree Tank System Number: **542**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_FINAL PACKET	.pdf	7/5/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	7/5/2016	STEM Engineering Evaluation Spreadsheet
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_FINAL PACKET	.pdf	7/5/2016	Work Request
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_FINAL PACKET	.pdf	7/5/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_WALKDOWN	.pdf	7/5/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_IR VERIFICATION	.pdf	7/1/2016	IR Verification Field Data Sheet
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_1224_NORMAL	.mp4	6/30/2016	IR Camera Video Normal Operations
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_1225_DUMP	.mp4	6/30/2016	IR Camera Video During Dump Event
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_1225_DUMP	.mp4	6/30/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01**

**Consent Decree Tank System Number:** **542**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>23,101</b>	<b>23,101</b>	
Total VCS Capacity (scfh)	<b>26,472</b>	<b>27,701</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,726</b>	<b>22,954</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 11/9/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 11/16/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01**

Consent Decree Tank System Number: **542**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>l</sup>	238	
Mscfd	17	

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	4,747	4,746

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01

**Consent Decree Tank System Number:** 542

**Audit Notes**

The walkdown checklist (KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (KEISHA WHITE WOODY ABBEY T3N-R64W-S1 L01\_FINAL PACKET).

The Work Request Form says "Disconnect HP oil dumps on separator #1 and #3 and route to old Keisha White D1-1,7,8 separator #2 converted to LP". The Job Sheet makes no mention of making this change. However the walkdown checklist item C5 on page 7 of the final packet and 2 oil dump lines abandoned on page 26 of the final packet were used to confirm this change.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERKSIEK T6N-R64W-S18 L02**

Consent Decree Tank System Number: **1918/1424**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_FINAL PACKET	.pdf	12/7/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_STEM Engineering Evaluation_rev1	.xlsm	12/19/2016	STEM Engineering Evaluation Spreadsheet
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_SIGNED EVAL	.pdf	12/19/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_FINAL PACKET	.pdf	12/7/2016	Work Request
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_FINAL PACKET	.pdf	12/7/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_WALKDOWN	.pdf	12/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_IR VERIFICATION	.pdf	12/2/2016	IR Verification Field Data Sheet
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_1762_NORMAL	.mp4	11/30/2016	IR Camera Video Normal Operations
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_1763_DUMP	.mp4	11/30/2016	IR Camera Video During Dump Event
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_1764_POST	.mp4	11/30/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KERKSIEK T6N-R64W-S18 L01 & KERKSIEK T6N-R64W-S18 L02_SIGNED EVAL	.pdf	12/19/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERKSIEK T6N-R64W-S18 L02**

Consent Decree Tank System Number: **1918/1424**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,969</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>724</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,693</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>625</b>	<b>2,764</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 8/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/1/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERKSIEK T6N-R64W-S18 L02**

Consent Decree Tank System Number: **1918/1424**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERKSIEK T6N-R64W-S18 L02**

Consent Decree Tank System Number: **1918/1424**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

The Field Data Sheet indicated the VOC line on the top of the oil storage tanks to the KO pot was 2" NPS. There is no request to modify this section of piping. The NEI evaluation was completed with a 3" NPS from the tanks to the KO piping section. There is no confirmation of the piping modification. It is unknown whether the Engineering Design Standard was properly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **1121**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KERN T3N-R64W-S2 L01_FINAL PACKET	.pdf	12/5/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KERN T3N-R64W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	12/1/2016	STEM Engineering Evaluation Spreadsheet
KERN T3N-R64W-S2 L01_Final Signed STEM Plan	.pdf	1/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KERN T3N-R64W-S2 L01_FINAL PACKET	.pdf	12/5/2016	Work Request
KERN T3N-R64W-S2 L01_FINAL PACKET	.pdf	12/5/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KERN T3N-R64W-S2 L01_WALKDOWN	.pdf	12/5/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KERN T3N-R64W-S2 L01_IR VERIFICATION	.pdf	11/30/2016	IR Verification Field Data Sheet
KERN T3N-R64W-S2 L01_1750_NORMAL	.mp4	11/28/2016	IR Camera Video Normal Operations
KERN T3N-R64W-S2 L01_1751_DUMP	.mp4	11/28/2016	IR Camera Video During Dump Event
KERN T3N-R64W-S2 L01_1752_POST	.mp4	11/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KERN T3N-R64W-S2 L01_SIGNED EVAL	.pdf	12/8/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KERN T3N-R64W-S2 L01**

**Consent Decree Tank System Number:** **1121**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>342</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,110</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>666</b>	<b>1,155</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 3/6/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/30/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **1121**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **1121**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

There is no documentation that the 2" tank VOC line was replaced with a 3" as requested in the STEM Work Request form (Item 2 of the TANKS section, pg 3/29 of the Final Packet). Noble's Engineering Evaluation considers a 3" tank VOC line. It is unknown if the engineering design standard was strictly followed. Noble's model was rerun using 2" tank VOC line and the appropriate numbers added to the SLR Audit Checklist. Based on the more conservative numbers the VCS is still adequate for the expected PPIVF.

There is no documentation that the trim size for the LP oil dump valve was verified to be 1/2". The positive response ("YES") to Item A1 of the STEM Retrofit Walkdown Checklist will be used as confirmation that the trim size is consistent with the Engineering Evaluation.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T8N-R63W-8S L01**

Consent Decree Tank System Number: **1964**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-8S L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-8S L01_STEM Engineering Evaluation_rev1	.xlsm	8/21/2017	STEM Engineering Evaluation Spreadsheet
KERN T8N-R63W-8S L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-8S L01_FINAL PACKET	.pdf	8/4/2017	Work Request
KERN T8N-R63W-8S L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-8S L01_WALKDOWN	.pdf	8/4/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-8S L01_IR VERIFICATION	.pdf	7/28/2017	IR Verification Field Data Sheet
KERN T8N-R63W-8S L01_2177_NORMAL	.mp4	7/27/2017	IR Camera Video Normal Operations
KERN T8N-R63W-8S L01_2178_DUMP	.mp4	7/27/2017	IR Camera Video During Dump Event
KERN T8N-R63W-8S L01_2179_POST	.mp4	7/27/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-8S L01_SIGNED EVAL	.pdf		Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T8N-R63W-8S L01**

Consent Decree Tank System Number: **1964**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>170</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 1" (ro)</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>170</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>62,337</b>	<b>63,472</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>3,717</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>157,096</b>	<b>157,096</b>	
Total VCS Capacity (scfh)	<b>160,813</b>	<b>161,649</b>	
VCS Capacity minus PPIVF (scfh)	<b>98,476</b>	<b>98,177</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 8/23/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T8N-R63W-8S L01**

Consent Decree Tank System Number: **1964**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.80</b>							
Gas/Oil Ratio (scf/bbl)	<b>334.1</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>17.60</b>							
Critical Pressure (psia) <sup>b</sup>	<b>628</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>183</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3266</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1091.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>31</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>107.00</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>37572</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>150</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>211</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>11</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>45,462</b>	<b>46,237</b>
Oil Tank Working Rate	<b>1,294</b>	<b>1,313</b>
Water Tank Flash Rate	<b>6,262</b>	<b>5,460</b>
Water Tank Working Rate	<b>8,790</b>	<b>7,663</b>
Tank Breathing Rate	<b>1,664</b>	<b>1,664</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>63,472</b>	<b>62,337</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T8N-R63W-8S L01**

Consent Decree Tank System Number: **1964**

**Audit Notes**

A Work Order request was issued to "bottom out" two tanks; remove the fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet confirmed the tanks were "bottomed out," but the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C14, indicates all tank fill lines are configured to enable the LP separator to produce into all tanks.

Additional information is needed to clarify the inconsistent and conflicting information, thus it is unknown whether the Engineering Design Standard was properly applied.

NEI Data Request Response:

Field verification for this facility was completed on or around 6/21/17, field verification confirmed that two tanks were converted into headspace tanks (i.e. removed from liquid service but remained connected to vapor header).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T8N-R63W-S20 L01**

Consent Decree Tank System Number: **1998**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-S20 L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection
112_KERN T8N-R63W-S20 L01_FINAL PACKET_Rev	.pdf	11/14/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	8/18/2017	STEM Engineering Evaluation Spreadsheet
KERN T8N-R63W-S20 L01_Final Signed STEM Plan	.pdf	12/12/2017	Final Signed Engineering Evaluation
112_KERN T8N-R63W-S20 L01_STEM Engineering Evaluation_rev1_Rev	.xlsm	11/14/2018	STEM Engineering Evaluation Spreadsheet
112_KERN T8N-R63W-S20 L01_Final Signed STEM Plan_Rev	.pdf	11/14/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-S20 L01_FINAL PACKET	.pdf	8/4/2017	Work Request
KERN T8N-R63W-S20 L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets
112_KERN T8N-R63W-S20 L01_FINAL PACKET_Rev	.pdf	11/14/2018	Work Request
112_KERN T8N-R63W-S20 L01_FINAL PACKET_Rev	.pdf	11/14/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-S20 L01_WALKDOWN	.pdf	8/4/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-S20 L01_IR VERIFICATION	.pdf	7/28/2017	IR Verification Field Data Sheet
KERN T8N-R63W-S20 L01_2174_NORMAL	.mp4	7/27/2017	IR Camera Video Normal Operations
KERN T8N-R63W-S20 L01_2175_DUMP	.mp4	7/27/2017	IR Camera Video During Dump Event
KERN T8N-R63W-S20 L01_2176_POST	.mp4	7/27/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KERN T8N-R63W-S20 L01_SIGNED EVAL	.pdf	8/29/2017	Final Signed Engineering Evaluation
112_KERN T8N-R63W-S20 L01_SIGNED EVAL_Rev	.pdf	11/14/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T8N-R63W-S20 L01**

Consent Decree Tank System Number: **1998**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>220</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>220</b>	<b>220</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>105,851</b>	<b>105,856</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,717</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>252,463</b>	<b>154,688</b>	
Total VCS Capacity (scfh)	<b>256,180</b>	<b>159,241</b>	
VCS Capacity minus PPIVF (scfh)	<b>150,329</b>	<b>53,385</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 3/5/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T8N-R63W-S20 L01**

Consent Decree Tank System Number: **1998**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.93</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>2.04</b>							
Gas/Oil Ratio (scf/bbl)	<b>485.6</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>673</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>233</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.80</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4730</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>2297.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>45</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>8537</b>	<b>8537</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>34</b>	<b>34</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>48</b>	<b>48</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>95,715</b>	<b>95,715</b>
Oil Tank Working Rate	<b>1,874</b>	<b>1,870</b>
Water Tank Flash Rate	<b>2,846</b>	<b>2,846</b>
Water Tank Working Rate	<b>3,995</b>	<b>3,994</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>105,856</b>	<b>105,851</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KERN T8N-R63W-S20 L01**

Consent Decree Tank System Number: **1998**

### Audit Notes

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

The stem work request form (PG 3 of FINAL PACKET pdf) states the pneumatic pssh was to be set to shut in @ 165 psig in the HP separator however nowhere in the job sheets (PGs 20 through 24 of FINAL PACKET pdf) does it confirm this task was completed.

NOBLE RESPONSE:

Rework was completed on or around 4/11/2018, which increased the HP separator pressure to no higher than 220 psig.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KILDOW TIMKO T4N-R64W-S31 L01**

Consent Decree Tank System Number: **681**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KILDOW TIMKO T4N-R64W-S31 L01_FINAL PACKET	.pdf	5/22/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KILDOW TIMKO T4N-R64W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	5/22/2017	STEM Engineering Evaluation Spreadsheet
KILDOW TIMKO T4N-R64W-S31 L01_SIGNED EVAL	.pdf	5/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KILDOW TIMKO T4N-R64W-S31 L01_FINAL PACKET	.pdf	5/22/2017	Work Request
KILDOW TIMKO T4N-R64W-S31 L01_FINAL PACKET	.pdf	5/22/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KILDOW TIMKO T4N-R64W-S31 L01_WALKDOWN	.pdf	5/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KILDOW TIMKO T4N-R64W-S31 L01_IR VERIFICATION	.pdf	5/10/2017	IR Verification Field Data Sheet
KILDOW TIMKO T4N-R64W-S31 L01_2042_NORMAL	.mp4	5/10/2017	IR Camera Video Normal Operations
KILDOW TIMKO T4N-R64W-S31 L01_2043_DUMP	.mp4	5/10/2017	IR Camera Video During Dump Event
KILDOW TIMKO T4N-R64W-S31 L01_2044_POST	.mp4	5/10/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KILDOW TIMKO T4N-R64W-S31 L01_SIGNED EVAL	.pdf	5/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KILDOW TIMKO T4N-R64W-S31 L01**

**Consent Decree Tank System Number:** **681**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,938</b>	<b>1,938</b>	
Total VCS Capacity (scfh)	<b>5,490</b>	<b>6,538</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,809</b>	<b>2,855</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 5/16/2018

Audit Document Review Verified by: Patrick Dilsaver

Audit Document Verification Date: 9/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KILDOW TIMKO T4N-R64W-S31 L01**

Consent Decree Tank System Number: **681**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KILDOW TIMKO T4N-R64W-S31 L01**

Consent Decree Tank System Number: **681**

**Audit Notes**

**QC STEM Checkout Form**

The QC STEM Checkout Form (Final Packet, pg 26) indicates the LP separator with SN: 3855 was set to shut in at 60psi. The Field Datasheets (Final Packet, pg 14) indicates the HPLP separator, the separator which has remained onsite and is operating, has a serial number of SN: 3835 for the HP side, and SN: 3872 for the LP side of the separator.

The LP Sep (SN: 3855) which was set to shut in at 60 psi on the QC STEM Checkout form, does not match the serial numbers of the separator which was previously onsite. SLR believes this to be a typo, as ITEM B3 is checked "yes" in the STEM Walkdown Checklist (Final Packet, pg 28), confirming max separator set pressures are set according to design.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KISSLER BOOTH T4N-R64W-S23 L01**

Consent Decree Tank System Number: **468**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KISSLER BOOTH T4N-R64W-S23 L01_FINAL PACKET	.pdf	3/30/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KISSLER BOOTH T4N-R64W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	4/4/2017	STEM Engineering Evaluation Spreadsheet
KISSLER BOOTH T4N-R64W-S23 L01_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KISSLER BOOTH T4N-R64W-S23 L01_FINAL PACKET	.pdf	3/30/2017	Work Request
KISSLER BOOTH T4N-R64W-S23 L01_FINAL PACKET	.pdf	3/30/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KISSLER BOOTH T4N-R64W-S23 L01_WALKDOWN	.pdf	3/30/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KISSLER BOOTH T4N-R64W-S23 L01_IR VERIFICATION	.pdf	3/30/2017	IR Verification Field Data Sheet
KISSLER BOOTH T4N-R64W-S23 L01_1893_NORMAL	.mp4	3/23/2017	IR Camera Video Normal Operations
KISSLER BOOTH T4N-R64W-S23 L01_1894_DUMP	.mp4	3/23/2017	IR Camera Video During Dump Event
KISSLER BOOTH T4N-R64W-S23 L01_1895_POST	.mp4	3/23/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KISSLER BOOTH T4N-R64W-S23 L01_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KISSLER BOOTH T4N-R64W-S23 L01**

**Consent Decree Tank System Number:** **468**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,582</b>	<b>14,167</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>30,452</b>	<b>30,452</b>	
Total VCS Capacity (scfh)	<b>34,004</b>	<b>35,052</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,422</b>	<b>20,885</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/3/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/30/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KISSLER BOOTH T4N-R64W-S23 L01**

Consent Decree Tank System Number: **468**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.50</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.61</b>							
Gas/Oil Ratio (scf/bbl)	<b>256.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>601</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>153</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1237</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>316.8</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>12</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>13,202</b>	<b>12,639</b>
Oil Tank Working Rate	<b>490</b>	<b>468</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>14,167</b>	<b>13,582</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KISSLER BOOTH T4N-R64W-S23 L01**

Consent Decree Tank System Number: **468**

**Audit Notes**

The walkdown checklist (KISSLER BOOTH T4N-R64W-S23 L01\_WALKDOWN, p 4) was not marked as complete. Completion was confirmed through other documentation in the final packet (KISSLER BOOTH T4N-R64W-S23 L01\_FINAL PACKET).

A Leed 270 Separator was installed (KISSLER BOOTH T4N-R64W-S23 L01\_FINAL PACKET, p 20) on the site after the existing separators were removed. The walkdown checklist (KISSLER BOOTH T4N-R64W-S23 L01\_WALKDOWN, p 1) A1 confirms it has a 1/2" trim, but there is no indication of the new valve size. A 2" valve was used in the model to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The separator pneumatic PSHH is set by the operator not automation and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 140 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KLEIN HANSCOME T4N-R65W-S12 L01**

**Consent Decree Tank System Number:** **244**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KLEIN HANSCOME T4N-R65W-S12 L01_FINAL PACKET	.pdf	4/13/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KLEIN HANSCOME T4N-R65W-S12 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	11/17/2017	STEM Engineering Evaluation Spreadsheet
KLEIN HANSCOME T4N-R65W-S12 L01_SIGNED EVAL	.pdf	12/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KLEIN HANSCOME T4N-R65W-S12 L01_FINAL PACKET	.pdf	4/13/2016	Work Request
KLEIN HANSCOME T4N-R65W-S12 L01_FINAL PACKET	.pdf	4/13/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KLEIN HANSCOME T4N-R65W-S12 L01_WALKDOWN	.pdf	4/13/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KLEIN HANSCOME T4N-R65W-S12 L01_IR VERIFICATION	.pdf	4/5/2016	IR Verification Field Data Sheet
KLEIN HANSCOME T4N-R65W-S12 L01_0821_NORMAL	.mp4	4/4/2016	IR Camera Video Normal Operations
KLEIN HANSCOME T4N-R65W-S12 L01_0822_DUMP	.mp4	4/4/2016	IR Camera Video During Dump Event
KLEIN HANSCOME T4N-R65W-S12 L01_0823_POST	.mp4	4/4/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KLEIN HANSCOME T4N-R65W-S12 L01_SIGNED EVAL	.pdf	12/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KLEIN HANSCOME T4N-R65W-S12 L01**

**Consent Decree Tank System Number:** **244**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>11,306</b>	<b>11,666</b>	<b>3%</b>
Calculated Burner Capacity (scfh)	<b>5,637</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>22,111</b>	<b>22,111</b>	
Total VCS Capacity (scfh)	<b>27,748</b>	<b>33,778</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,442</b>	<b>22,111</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 3/26/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 4/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KLEIN HANSCOME T4N-R65W-S12 L01**

Consent Decree Tank System Number: **244**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	2,527	2,527
Total	11,666	11,306

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KLEIN HANSCOME T4N-R65W-S12 L01**

Consent Decree Tank System Number: **244**

**Audit Notes**

The Work Request indicated the oil dump valves on Separators 1 & 3 were to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on either separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KLEIN T5N-R64W-S16 L01**

Consent Decree Tank System Number: **308**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KLEIN T5N-R64W-S16 L01_FINAL PACKET	.pdf	5/11/2016	Pre-Evaluation Facility Inspection
KLEIN T5N-R64W-S16 L01_TLO FINAL PACKET	.pdf	12/10/2018	Pre-Evaluation Facility Inspection for TLO Project

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KLEIN T5N-R64W-S16 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2017	STEM Engineering Evaluation Spreadsheet
KLEIN T5N-R64W-S16 L01_Final Signed STEM Plan	.pdf	10/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KLEIN T5N-R64W-S16 L01_FINAL PACKET	.pdf	5/11/2016	Work Request
KLEIN T5N-R64W-S16 L01_FINAL PACKET	.pdf	5/11/2016	Construction Jobsheets
KLEIN T5N-R64W-S16 L01_TLO FINAL PACKET	.pdf	12/10/2018	Work Request for TLO Project
KLEIN T5N-R64W-S16 L01_TLO FINAL PACKET	.pdf	12/10/2018	Construction Jobsheets for TLO Project

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KLEIN T5N-R64W-S16 L01_WALKDOWN	.pdf	5/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KLEIN T5N-R64W-S16 L01_IR VERIFICATION	.pdf	5/10/2016	IR Verification Field Data Sheet
KLEIN T5N-R64W-S16 L01_0943_NORMAL	.mp4	5/4/2016	IR Camera Video Normal Operations
KLEIN T5N-R64W-S16 L01_0944_DUMP	.mp4	5/4/2016	IR Camera Video During Dump Event
KLEIN T5N-R64W-S16 L01_0945_POST	.mp4	5/4/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KLEIN T5N-R64W-S16 L01_SIGNED EVAL	.pdf	7/17/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KLEIN T5N-R64W-S16 L01**

Consent Decree Tank System Number: **308**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>9</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>110</b>	<b>110</b>	<b>110</b>					
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>30,036</b>	<b>30,039</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,001</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>55,603</b>	<b>55,603</b>	
Total VCS Capacity (scfh)	<b>60,604</b>	<b>67,270</b>	
VCS Capacity minus PPIVF (scfh)	<b>30,568</b>	<b>37,231</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 12/13/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/30/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KLEIN T5N-R64W-S16 L01**

Consent Decree Tank System Number: **308**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.25	1.25	1.25					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	1.37	1.37	1.37					
Gas/Oil Ratio (scf/bbl)	188.3	188.3	188.3					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94	0.94	0.94					
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72	5.72	5.72					
Critical Pressure (psia) <sup>b</sup>	575	575	575					
Vapor Pressure (psia) <sup>c</sup>	123	123	123					
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.83	0.83	0.83					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	1026	1026	1026					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	193.2	193.2	193.2					
Working Flow (Mscfd) <sup>h,i</sup>	10	10	10					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	51	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	24,152	24,152
Oil Tank Working Rate	1,220	1,217
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	2,140	2,140
Truck Loading Vapor	2,527	2,527
<b>Total</b>	<b>30,039</b>	<b>30,036</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KLEIN T5N-R64W-S16 L01**

Consent Decree Tank System Number: **308**

### Audit Notes

The walkdown states there are 2 banks of tanks (5 oil and 4 oil). Signed evaluation and field data sheets indicate that the tanks are not banked. Noble provided a response to the above discrepancy on 12/10/2018 that states "The Tank Truck Loadout Final Packet dated 12/9/2016, provides confirmation that tanks are not banked."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KNAUB STROHAUER T4N-R65W-S5 L01**

Consent Decree Tank System Number: **254**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KNAUB STROHAUER T4N-R65W-S5 L01_FINAL PACKET	.pdf	7/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KNAUB STROHAUER T4N-R65W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	7/28/2016	STEM Engineering Evaluation Spreadsheet
KNAUB STROHAUER T4N-R65W-S5 L01_Final Signed STEM Plan	.pdf	10/19/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KNAUB STROHAUER T4N-R65W-S5 L01_FINAL PACKET	.pdf	7/11/2016	Work Request
KNAUB STROHAUER T4N-R65W-S5 L01_FINAL PACKET	.pdf	7/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KNAUB STROHAUER T4N-R65W-S5 L01_WALKDOWN	.pdf	7/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KNAUB STROHAUER T4N-R65W-S5 L01_IR VERIFICATION	.pdf	7/8/2016	IR Verification Field Data Sheet
KNAUB STROHAUER T4N-R65W-S5 L01_1257_NORMAL	.mp4	7/7/2016	IR Camera Video Normal Operations
KNAUB STROHAUER T4N-R65W-S5 L01_1258_DUMP	.mp4	7/7/2016	IR Camera Video During Dump Event
KNAUB STROHAUER T4N-R65W-S5 L01_1259_POST	.mp4	7/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KNAUB STROHAUER T4N-R65W-S5 L01_SIGNED EVAL	.pdf	8/2/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KNAUB STROHAUER T4N-R65W-S5 L01**

**Consent Decree Tank System Number:** **254**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,034</b>	<b>8,035</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>43,281</b>	<b>43,281</b>	
Total VCS Capacity (scfh)	<b>47,044</b>	<b>47,834</b>	
VCS Capacity minus PPIVF (scfh)	<b>39,010</b>	<b>39,799</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 3/5/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/31/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KNAUB STROHAUER T4N-R65W-S5 L01**

Consent Decree Tank System Number: **254**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.80</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>162.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>6,753</b>	<b>6,753</b>
Oil Tank Working Rate	<b>569</b>	<b>568</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>8,035</b>	<b>8,034</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KNAUB STROHAUER T4N-R65W-S5 L01**

Consent Decree Tank System Number: **254**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KNAUS D T6N-R66W-S28 L01**

**Consent Decree Tank System Number:** **908**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KNAUS D T6N-R66W-S28 L01_FINAL PACKET	.pdf	12/23/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KNAUS D T6N-R66W-S28 L01_STEM Engineering Evaluation_rev1	.xls	6/27/2017	STEM Engineering Evaluation Spreadsheet
KNAUS D T6N-R66W-S28 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KNAUS D T6N-R66W-S28 L01_FINAL PACKET	.pdf	12/23/2015	Work Request
KNAUS D T6N-R66W-S28 L01_FINAL PACKET	.pdf	12/23/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KNAUS D T6N-R66W-S28 L01_WALKDOWN	.pdf	12/22/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KNAUS D T6N-R66W-S28 L01_IR VERIFICATION	.pdf	12/18/2015	IR Verification Field Data Sheet
KNAUS D T6N-R66W-S28 L01_0527_NORMAL	.mp4	12/17/2015	IR Camera Video Normal Operations
KNAUS D T6N-R66W-S28 L01_0528_DUMP	.mp4	12/17/2015	IR Camera Video During Dump Event
KNAUS D T6N-R66W-S28 L01_0529_POST	.mp4	12/17/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KNAUS D T6N-R66W-S28 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KNAUS D T6N-R66W-S28 L01**

Consent Decree Tank System Number: **908**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>501</b>	<b>501</b>	
Total VCS Capacity (scfh)	<b>4,269</b>	<b>5,101</b>	
VCS Capacity minus PPIVF (scfh)	<b>825</b>	<b>1,656</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/6/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KNAUS D T6N-R66W-S28 L01**

Consent Decree Tank System Number: **908**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KNAUS D T6N-R66W-S28 L01**

Consent Decree Tank System Number: **908**

**Audit Notes**

The work request (FINAL PACKET pg.3) states that the VOC line to the burner needs to be raised above grade and increased to 4". There is no verification that this work was completed (FINAL PACKET pg. 5-29)

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 11/13/2015, field verification confirmed that the 4" above ground VOC line was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOEHLER T6N-R65W-S33 L01**

Consent Decree Tank System Number: **71**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KOEHLER T6N-R65W-S33 L01_FINAL PACKET	.pdf	2/9/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KOEHLER T6N-R65W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
KOEHLER T6N-R65W-S33 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KOEHLER T6N-R65W-S33 L01_FINAL PACKET	.pdf	2/9/2016	Work Request
KOEHLER T6N-R65W-S33 L01_FINAL PACKET	.pdf	2/9/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KOEHLER T6N-R65W-S33 L01_WALKDOWN	.pdf	2/9/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KOEHLER T6N-R65W-S33 L01_IR VERIFICATION	.pdf	2/5/2016	IR Verification Field Data Sheet
KOEHLER T6N-R65W-S33 L01_0656_NORMAL	.mp4	2/3/2016	IR Camera Video Normal Operations
KOEHLER T6N-R65W-S33 L01_0657_DUMP	.mp4	2/3/2016	IR Camera Video During Dump Event
KOEHLER T6N-R65W-S33 L01_0658_POST	.mp4	2/3/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KOEHLER T6N-R65W-S33 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KOEHLER T6N-R65W-S33 L01**

**Consent Decree Tank System Number:** **71**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,021</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>5,502</b>	<b>5,502</b>	
Total VCS Capacity (scfh)	<b>9,523</b>	<b>10,102</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,539</b>	<b>5,117</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/27/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOEHLER T6N-R65W-S33 L01**

Consent Decree Tank System Number: **71**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

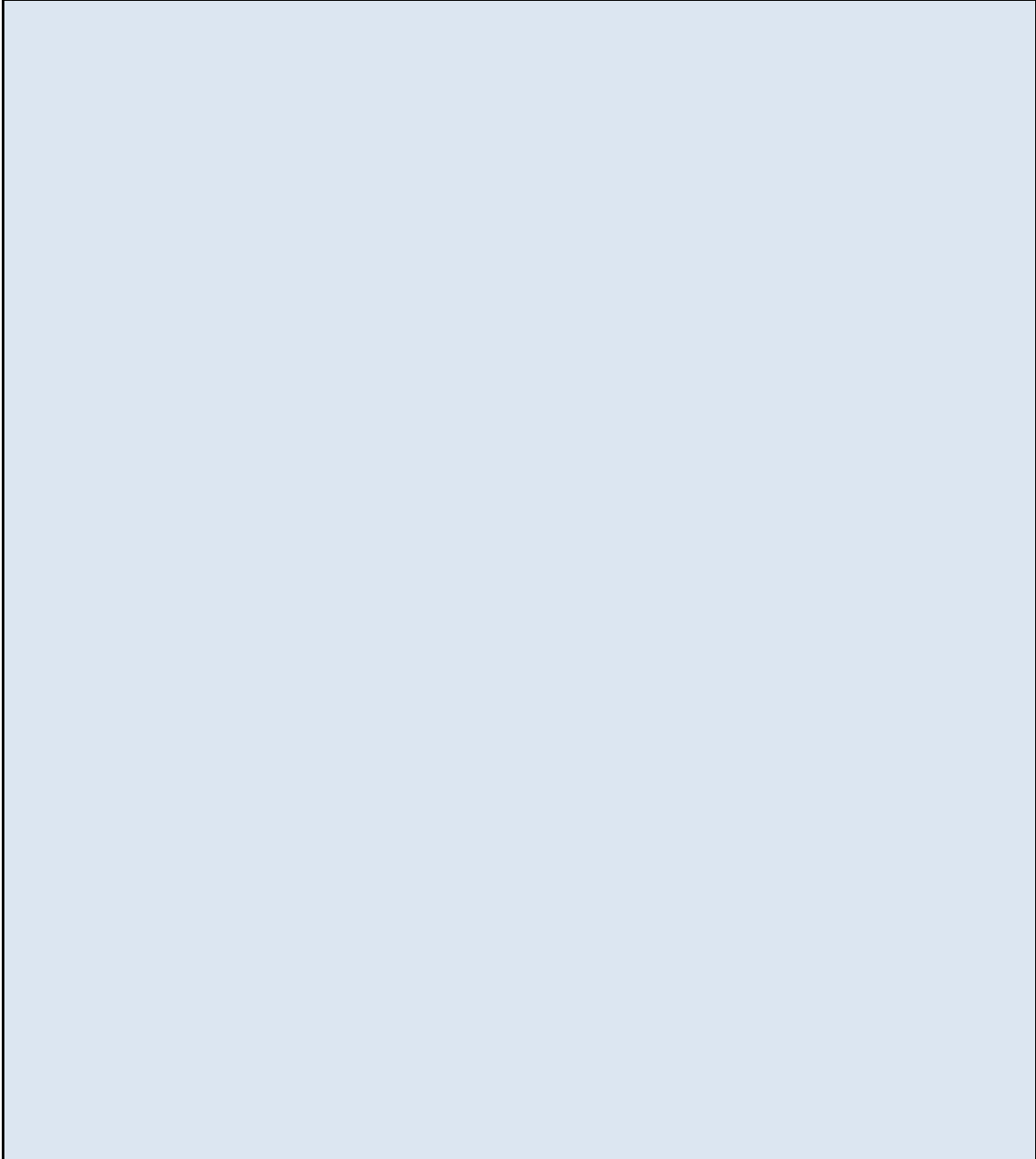
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOEHLER T6N-R65W-S33 L01**

Consent Decree Tank System Number: **71**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLER T5N-R64W-S21 L01**

Consent Decree Tank System Number: **2246**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KOHLER T5N-R64W-S21 L01_FINAL PACKET	.pdf	3/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KOHLER T5N-R64W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	3/18/2016	STEM Engineering Evaluation Spreadsheet
KOHLER T5N-R64W-S21 L01_SIGNED EVAL	.pdf	3/28/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KOHLER T5N-R64W-S21 L01_FINAL PACKET	.pdf	3/16/2016	Work Request
KOHLER T5N-R64W-S21 L01_FINAL PACKET	.pdf	3/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KOHLER T5N-R64W-S21 L01_WALKDOWN	.pdf	3/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KOHLER T5N-R64W-S21 L01_IR VERIFICATION	.pdf	3/16/2016	IR Verification Field Data Sheet
KOHLER T5N-R64W-S21 L01_0762_NORMAL	.mp4	3/14/2016	IR Camera Video Normal Operations
KOHLER T5N-R64W-S21 L01_0763_DUMP	.mp4	3/14/2016	IR Camera Video During Dump Event
KOHLER T5N-R64W-S21 L01_0764_POST	.mp4	3/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KOHLER T5N-R64W-S21 L01_SIGNED EVAL	.pdf	3/28/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KOHLER T5N-R64W-S21 L01**

**Consent Decree Tank System Number:** **2246**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,587</b>	<b>3,445</b>	<b>-4%</b>
Calculated Burner Capacity (scfh)	<b>4,124</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>309</b>	<b>309</b>	
Total VCS Capacity (scfh)	<b>4,433</b>	<b>4,909</b>	
VCS Capacity minus PPIVF (scfh)	<b>846</b>	<b>1,464</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/11/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/12/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLER T5N-R64W-S21 L01**

Consent Decree Tank System Number: **2246**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>3,049</b>
Oil Tank Working Rate	<b>288</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,587</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLER T5N-R64W-S21 L01**

Consent Decree Tank System Number: **2246**

**Audit Notes**

The stem work request and job sheets confirm the lp oil dump valve and trim was changed to a 1" 1400 with ½" trim however it appears the site was modeled with a 2" dump valve with ½" trim according to the stem engineering design form.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLHOFF T7N-R63W-S9 L01**

Consent Decree Tank System Number: **1970**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KOHLHOFF T7N-R63W-S9 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF T7N-R63W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
KOHLHOFF T7N-R63W-S9 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF T7N-R63W-S9 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
KOHLHOFF T7N-R63W-S9 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF T7N-R63W-S9 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF T7N-R63W-S9 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
KOHLHOFF T7N-R63W-S9 L01_1278_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
KOHLHOFF T7N-R63W-S9 L01_1279_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
KOHLHOFF T7N-R63W-S9 L01_1280_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF T7N-R63W-S9 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLHOFF T7N-R63W-S9 L01**

Consent Decree Tank System Number: **1970**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>200</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>200</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>30,646</b>	<b>30,648</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>84,731</b>	<b>84,731</b>	
Total VCS Capacity (scfh)	<b>88,494</b>	<b>89,284</b>	
VCS Capacity minus PPIVF (scfh)	<b>57,848</b>	<b>58,636</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLHOFF T7N-R63W-S9 L01**

Consent Decree Tank System Number: **1970**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.84</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.95</b>							
Gas/Oil Ratio (scf/bbl)	<b>421.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>655</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>213</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.80</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1533</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>646.5</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>15</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>2801</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>11</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>16</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>500</b>
scfh vapor/tank <sup>i</sup>	<b>396</b>	<b>396</b>
Mscfd	<b>29</b>	<b>19</b>

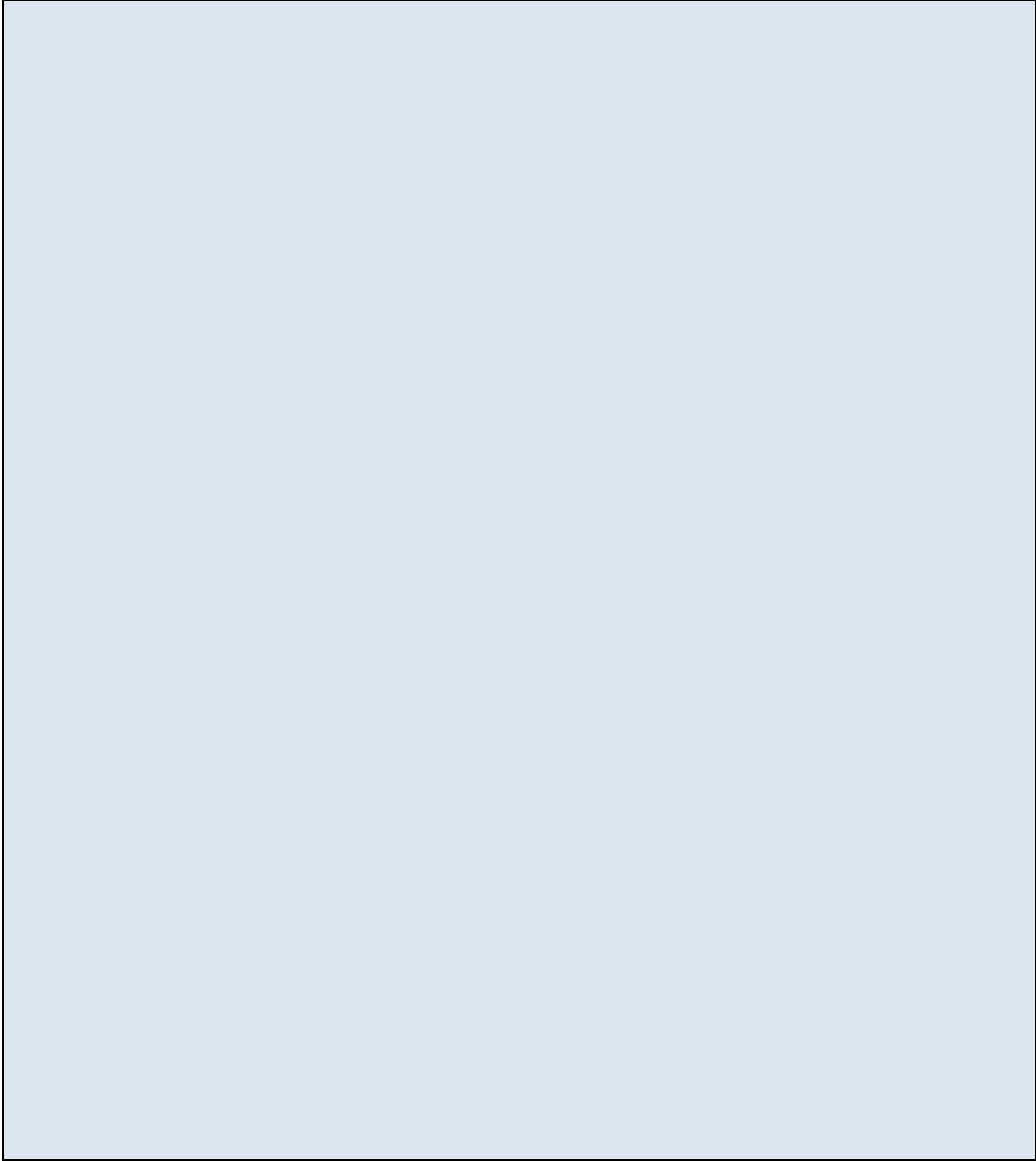
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>26,937</b>	<b>26,937</b>
Oil Tank Working Rate	<b>607</b>	<b>606</b>
Water Tank Flash Rate	<b>467</b>	<b>467</b>
Water Tank Working Rate	<b>655</b>	<b>655</b>
Tank Breathing Rate	<b>1,981</b>	<b>1,981</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>30,648</b>	<b>30,646</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLHOFF T7N-R63W-S9 L01**

Consent Decree Tank System Number: **1970**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLHOFF USX T7N-R64W-S17 L03**

Consent Decree Tank System Number: **1859**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KOHLHOFF USX T7N-R64W-S17 L03_FINAL PACKET	.pdf	9/23/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF USX T7N-R64W-S17 L03_STEM Engineering Evaluation_rev1	.xlsm	12/14/2017	STEM Engineering Evaluation Spreadsheet
KOHLHOFF USX T7N-R64W-S17 L03_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF USX T7N-R64W-S17 L03_FINAL PACKET	.pdf	9/23/2015	Work Request
KOHLHOFF USX T7N-R64W-S17 L03_FINAL PACKET	.pdf	9/23/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF USX T7N-R64W-S17 L03_FINAL PACKET	.pdf	9/23/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF USX T7N-R64W-S17 L03_IR VERIFICATION	.pdf	9/23/2015	IR Verification Field Data Sheet
KOHLHOFF USX T7N-R64W-S17 L03_0287_NORMAL	.mp4	9/21/2015	IR Camera Video Normal Operations
KOHLHOFF USX T7N-R64W-S17 L03_0288_DUMP	.mp4	9/21/2015	IR Camera Video During Dump Event
KOHLHOFF USX T7N-R64W-S17 L03_0289_POST	.mp4	9/21/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KOHLHOFF USX T7N-R64W-S17 L03_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KOHLHOFF USX T7N-R64W-S17 L03**

**Consent Decree Tank System Number:** **1859**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,502</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>6,110</b>	<b>6,110</b>	
Total VCS Capacity (scfh)	<b>11,612</b>	<b>17,777</b>	
VCS Capacity minus PPIVF (scfh)	<b>6,628</b>	<b>12,792</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 6/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLHOFF USX T7N-R64W-S17 L03**

Consent Decree Tank System Number: **1859**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

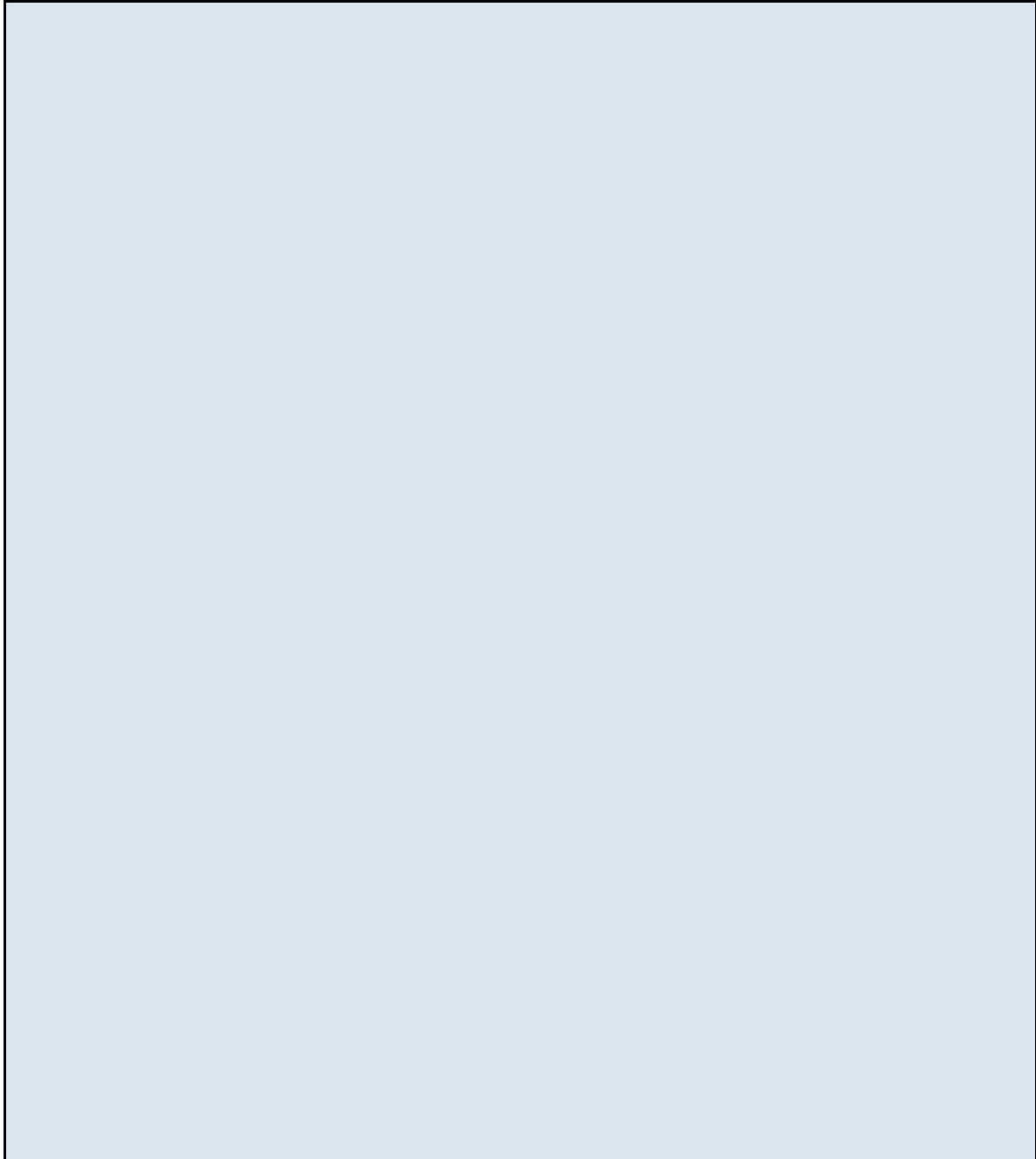
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KOHLHOFF USX T7N-R64W-S17 L03**

Consent Decree Tank System Number: **1859**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01**

Consent Decree Tank System Number: **164**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_FINAL PACKET	.pdf	1/16/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	1/17/2017	STEM Engineering Evaluation Spreadsheet
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_FINAL PACKET	.pdf	1/16/2017	Work Request
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_FINAL PACKET	.pdf	1/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_WALKDOWN	.pdf	1/16/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_IR VERIFICATION	.pdf	1/14/2017	IR Verification Field Data Sheet
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_0011_NORMAL	.mp4	1/11/2017	IR Camera Video Normal Operations
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_0012_DUMP	.mp4	1/11/2017	IR Camera Video During Dump Event
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_0013_POST	.mp4	1/11/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01**

Consent Decree Tank System Number: **164**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,244</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>2,339</b>	<b>4,529</b>	
Total VCS Capacity (scfh)	<b>6,337</b>	<b>9,487</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,255</b>	<b>5,244</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/19/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/6/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01**

Consent Decree Tank System Number: **164**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,454</b>	<b>3,307</b>
Oil Tank Working Rate	<b>314</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,244</b>	<b>4,082</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01**

Consent Decree Tank System Number: **164**

### Audit Notes

The Walkdown checklist (KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01\_WALKDOWN) was not marked as being complete. The site was verified through other supplied documentation in the final packet (KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01\_FINAL PACKET, p 27).

Per the Work Request (KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01\_FINAL PACKET.pdf, pg. 15) the oil dump valve is 2". The Job Sheet (KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01\_FINAL PACKET.pdf, pg 18) confirms 1/2" trim installed but does not indicate the oil dump valve size. The run model KROPP RUZICANO SILBERMAN T4N-R66W-S23 L01\_STEM Engineering Evaluation\_rev1) indicates the valve was 1". There was no documentation to change the valve size. A 2" valve was used in these calculations to be conservative. It is unknown if the modeling guideline was strictly followed for the tank system.

This site was selected for an additional IR camera inspection because the video is blurry.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KUIS CONNELL T4N-R64W-S5 L01**

Consent Decree Tank System Number: **614**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KUIS CONNELL T4N-R64W-S5 L01_FINAL PACKET	.pdf	12/12/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KUIS CONNELL T4N-R64W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	12/12/2016	STEM Engineering Evaluation Spreadsheet
KUIS CONNELL T4N-R64W-S5 L01_SIGNED EVAL	.pdf	12/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KUIS CONNELL T4N-R64W-S5 L01_FINAL PACKET	.pdf	12/12/2016	Work Request
KUIS CONNELL T4N-R64W-S5 L01_FINAL PACKET	.pdf	12/12/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KUIS CONNELL T4N-R64W-S5 L01_WALKDOWN	.pdf	12/12/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KUIS CONNELL T4N-R64W-S5 L01_IR VERIFICATION	.pdf	12/12/2016	IR Verification Field Data Sheet
KUIS CONNELL T4N-R64W-S5 L01_1797_NORMAL	.mp4	12/7/2016	IR Camera Video Normal Operations
KUIS CONNELL T4N-R64W-S5 L01_1798_DUMP	.mp4	12/7/2016	IR Camera Video During Dump Event
KUIS CONNELL T4N-R64W-S5 L01_1799_POST	.mp4	12/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KUIS CONNELL T4N-R64W-S5 L01_SIGNED EVAL	.pdf	12/15/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KUIS CONNELL T4N-R64W-S5 L01**

Consent Decree Tank System Number: **614**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>20,810</b>	<b>20,810</b>	
Total VCS Capacity (scfh)	<b>23,737</b>	<b>26,643</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,229</b>	<b>22,134</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/13/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/15/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KUIS CONNELL T4N-R64W-S5 L01**

Consent Decree Tank System Number: **614**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

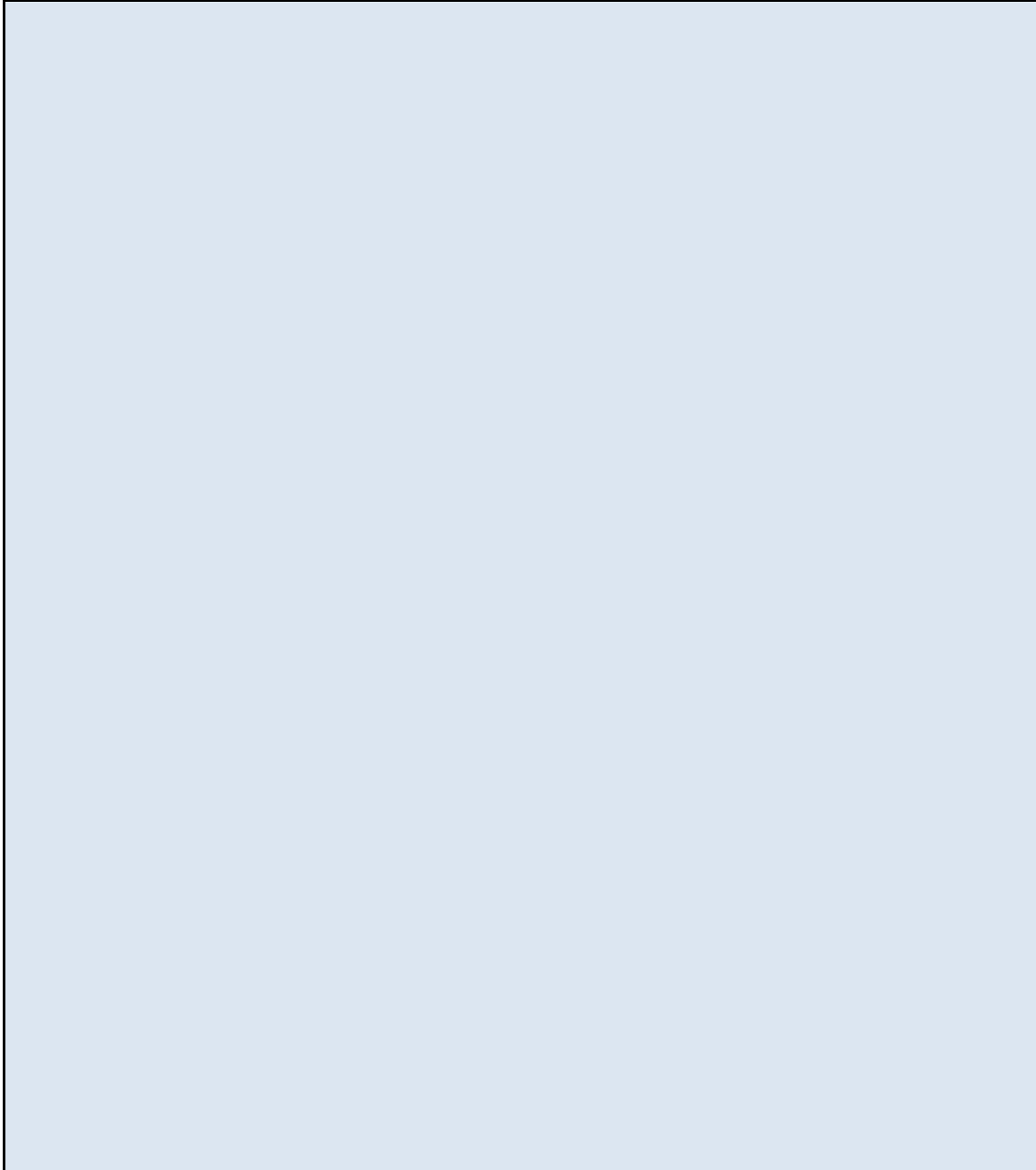
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KUIS CONNELL T4N-R64W-S5 L01**

Consent Decree Tank System Number: **614**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KUMMER T8N-R61W-S23 L03**

Consent Decree Tank System Number: **1926**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KUMMER T8N-R61W-S23 L03_FINAL PACKET	.pdf	11/8/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KUMMER T8N-R61W-S23 L03_STEM Engineering Evaluation_rev1_with TLO	.xlsm	11/29/2017	STEM Engineering Evaluation Spreadsheet
KUMMER T8N-R61W-S23 L03_SIGNED EVAL	.pdf	12/5/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
KUMMER T8N-R61W-S23 L03_FINAL PACKET	.pdf	11/8/2016	Work Request
KUMMER T8N-R61W-S23 L03_FINAL PACKET	.pdf	11/8/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KUMMER T8N-R61W-S23 L03_FINAL PACKET	.pdf	11/8/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KUMMER T8N-R61W-S23 L03_IR VERIFICATION	.pdf	11/4/2016	IR Verification Field Data Sheet
KUMMER T8N-R61W-S23 L03_1098_NORMAL	.mp4	11/3/2016	IR Camera Video Normal Operations
KUMMER T8N-R61W-S23 L03_1099_DUMP	.mp4	11/3/2016	IR Camera Video During Dump Event
KUMMER T8N-R61W-S23 L03_1100_POST	.mp4	11/3/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KUMMER T8N-R61W-S23 L03_SIGNED EVAL	.pdf	12/5/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KUMMER T8N-R61W-S23 L03**

**Consent Decree Tank System Number:** **1926**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>62,053</b>	<b>62,067</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>411,952</b>	<b>411,952</b>	
Total VCS Capacity (scfh)	<b>414,868</b>	<b>417,785</b>	
VCS Capacity minus PPIVF (scfh)	<b>352,815</b>	<b>355,718</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 6/7/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KUMMER T8N-R61W-S23 L03**

Consent Decree Tank System Number: **1926**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>107.00</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>10996</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1059.5</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>105</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>107.00</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>23591</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>94</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>132</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>500</b>
scfh vapor/tank <sup>i</sup>	<b>396</b>	<b>396</b>
Mscfd	<b>29</b>	<b>10</b>

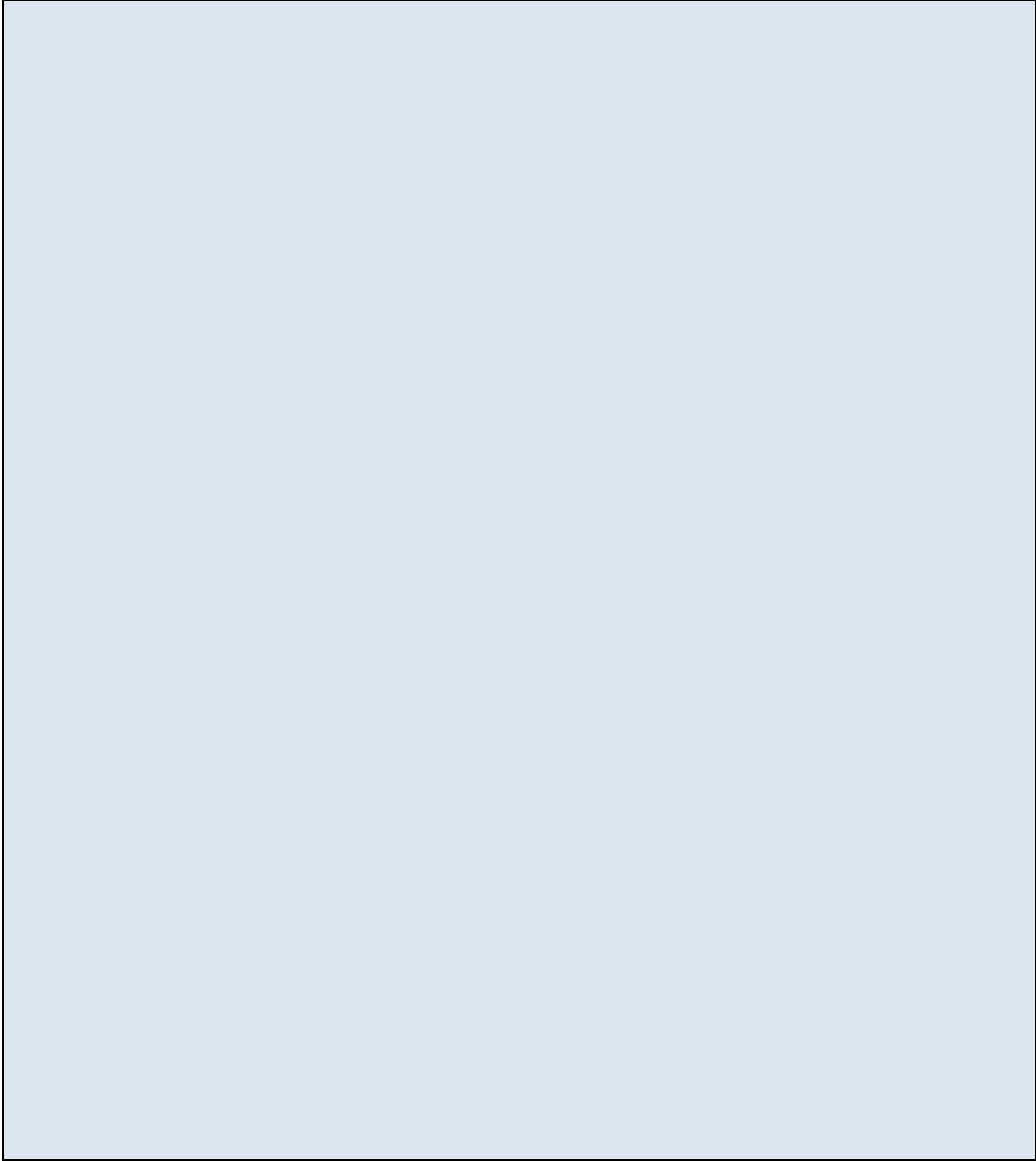
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>44,147</b>	<b>44,147</b>
Oil Tank Working Rate	<b>4,357</b>	<b>4,346</b>
Water Tank Flash Rate	<b>3,932</b>	<b>3,931</b>
Water Tank Working Rate	<b>5,519</b>	<b>5,517</b>
Tank Breathing Rate	<b>1,585</b>	<b>1,585</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>62,067</b>	<b>62,053</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KUMMER T8N-R61W-S23 L03**

Consent Decree Tank System Number: **1926**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KY BLUE DECHANT T3N-R65W-S25 L01**

Consent Decree Tank System Number: **399**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
KY BLUE DECHANT T3N-R65W-S25 L01_FINAL PACKET	.pdf	8/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
KY BLUE DECHANT T3N-R65W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	8/11/2017	STEM Engineering Evaluation Spreadsheet
KY BLUE DECHANT T3N-R65W-S25 L01_SIGNED EVAL	.pdf	8/14/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
	.pdf	8/10/2017	Work Request
KY BLUE DECHANT T3N-R65W-S25 L01_FINAL PACKET	.pdf	8/10/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
KY BLUE DECHANT T3N-R65W-S25 L01_WALKDOWN	.pdf	8/8/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
KY BLUE DECHANT T3N-R65W-S25 L01_IR VERIFICATION	.pdf	8/8/2017	IR Verification Field Data Sheet
KY BLUE DECHANT T3N-R65W-S25 L01_2242_NORMAL	.mp4	8/8/2017	IR Camera Video Normal Operations
KY BLUE DECHANT T3N-R65W-S25 L01_2243_DUMP	.mp4	8/8/2017	IR Camera Video During Dump Event
KY BLUE DECHANT T3N-R65W-S25 L01_2244_POST	.mp4	8/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
KY BLUE DECHANT T3N-R65W-S25 L01_SIGNED EVAL	.pdf	8/14/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **KY BLUE DECHANT T3N-R65W-S25 L01**

**Consent Decree Tank System Number:** **399**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>22,008</b>	<b>22,008</b>	
Total VCS Capacity (scfh)	<b>25,771</b>	<b>26,561</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,025</b>	<b>21,814</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/18/2018 & 11/26/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KY BLUE DECHANT T3N-R65W-S25 L01**

Consent Decree Tank System Number: **399**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **KY BLUE DECHANT T3N-R65W-S25 L01**

Consent Decree Tank System Number: **399**

**Audit Notes**

**1. STEM Walkdown Checklist**

ITEM C8 of the STEM Walkdown Checklist (Final Packet, pg 27) is checked "yes" indicating multiple LP oil dumps tie into a single line. Only (1) LP oil dump exists onsite, therefore ITEM C8 is marked incorrectly on the checklist.

ITEM C13 of the STEM Walkdown Checklist (Final Packet, pg 27) is checked "yes" indicating the LP separator can produce into all tanks, indicating there is not a vapor surge vessel onsite. The Engineering Evaluation and STEM Work Request Form (Final Packet, pg 3) indicate a vapor surge vessel should be onsite. See "Vapor Surge Vessel" note below for more.

**2. Vapor Surge Vessel**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did (did not) confirm a tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable separator to produce into all tanks. Additional information was not provided to clarify the inconsistent and conflicting information, thus it is unknown whether the Engineering Design Standard was properly applied.

**Request confirmation from Noble that one tank was bottomed out (isolated from liquid service and used as headspace only tank).**

**UPDATE 11/26/2018 - Noble confirmed an oil tank was bottomed out and converted into a vapor surge vessel onsite. The Engineering Design Standard has been properly applied.**

**3. Oil Dump Valve Trim Size**

Pg 21 of the Final Packet indicates a new LP separator was installed, which dumps to the oil tanks. The maximum oil dump valve size is specified at 1/2-inch. No data was provided indicating the size of the oil dump valve or the valve trim size. ITEM A1 in the STEM Walkdown Checklist (Final Packet, pg 25) is checked "yes" indicating the oil dump valve trim size onsite is consistent with that used in the Engineering Evaluation, and is therefore 1/2"

**4. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 9-14) are not dated. Date assumed to be same as Facility Scouting Date (12/21/2015).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LANG T7N-R64W-S35 L01**

Consent Decree Tank System Number: **1497**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LANG T7N-R64W-S35 L01_FINAL PACKET_REWORK	.pdf	10/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LANG T7N-R64W-S35 L01_STEM Engineering Evaluation_rev1_LP Upgrade	.xlsm	10/23/2017	STEM Engineering Evaluation Spreadsheet
LANG T7N-R64W-S35 L01_SIGNED EVAL_REWORK	.pdf	11/2/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LANG T7N-R64W-S35 L01_FINAL PACKET_REWORK	.pdf	10/20/2017	Work Request
LANG T7N-R64W-S35 L01_FINAL PACKET_REWORK	.pdf	10/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LANG T7N-R64W-S35 L01_WALKDOWN_REWORK	.pdf	4/24/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LANG T7N-R64W-S35 L01_IR VERIFICATION_REWORK	.pdf	10/16/2017	IR Verification Field Data Sheet
LANG T7N-R64W-S35 L01_4760_NORMAL_REWORK	.mp4	10/16/2017	IR Camera Video Normal Operations
LANG T7N-R64W-S35 L01_4761_DUMP_REWORK	.mp4	10/16/2017	IR Camera Video During Dump Event
	.mp4		IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LANG T7N-R64W-S35 L01_SIGNED EVAL_REWORK	.pdf	11/2/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LANG T7N-R64W-S35 L01**

Consent Decree Tank System Number: **1497**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>7,411</b>	<b>9,153</b>	
Headspace Surge Capacity (scfh)	<b>893</b>	<b>893</b>	
Total VCS Capacity (scfh)	<b>8,304</b>	<b>10,046</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,796</b>	<b>5,357</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/10/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LANG T7N-R64W-S35 L01**

Consent Decree Tank System Number: **1497**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LANG T7N-R64W-S35 L01**

Consent Decree Tank System Number: **1497**

**Audit Notes**

The walkdown checklist (LANG T7N-R64W-S35 L01\_WALKDOWN\_REWORK) was not marked as being complete. Completion was verified through other documentation in the final packet (LANG T7N-R64W-S35 L01\_FINAL\_PACKET\_REWORK).

Page 46 of the FINAL PACKET REWORK (LANG T7N-R64W-S35 L01\_FINAL\_PACKET\_REWORK) states a new D grade separator was installed. A1 from the walkdown checklist (LANG T7N-R64W-S35 L01\_WALKDOWN\_REWORK, p 4) confirms the 1/2" trim on the signed eval (LANG T7N-R64W-S35 L01\_SIGNED\_EVAL\_REWORK) is correct. A 2" valve was used in these calculations to be conservative. It is unknown if the modeling guideline was strictly followed for the tank system.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LARSON T6N-R64W-S32 L01**

Consent Decree Tank System Number: **276**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LARSON T6N-R64W-S32 L01_FINAL PACKET	.pdf	1/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LARSON T6N-R64W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	12/15/2016	STEM Engineering Evaluation Spreadsheet
LARSON T6N-R64W-S32 L01_Final Signed STEM Plan	.pdf	1/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LARSON T6N-R64W-S32 L01_FINAL PACKET	.pdf	1/11/2016	Work Request
LARSON T6N-R64W-S32 L01_FINAL PACKET	.pdf	1/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LARSON T6N-R64W-S32 L01_WALKDOWN	.pdf	1/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LARSON T6N-R64W-S32 L01_IR VERIFICATION	.pdf	1/8/2016	IR Verification Field Data Sheet
LARSON T6N-R64W-S32 L01_0575_NORMAL	.mp4	1/7/2016	IR Camera Video Normal Operations
LARSON T6N-R64W-S32 L01_0576_DUMP	.mp4	1/7/2016	IR Camera Video During Dump Event
LARSON T6N-R64W-S32 L01_0577_POST	.mp4	1/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LARSON T6N-R64W-S32 L01_SIGNED EVAL	.pdf	1/6/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LARSON T6N-R64W-S32 L01**

Consent Decree Tank System Number: **276**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,473</b>	<b>2,473</b>	
Total VCS Capacity (scfh)	<b>5,199</b>	<b>8,306</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,518</b>	<b>4,624</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 3/29/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/21/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LARSON T6N-R64W-S32 L01**

Consent Decree Tank System Number: **276**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LARSON T6N-R64W-S32 L01**

Consent Decree Tank System Number: **276**

**Audit Notes**

The walkdown checklist is not marked complete

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LAZY T2N-R64W-S8 L01**

Consent Decree Tank System Number: **2146**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LAZY T2N-R64W-S8 L01_FINAL PACKET	.pdf	6/2/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LAZY T2N-R64W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	6/14/2017	STEM Engineering Evaluation Spreadsheet
LAZY T2N-R64W-S8 L01_SIGNED EVAL	.pdf	6/14/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LAZY T2N-R64W-S8 L01_FINAL PACKET	.pdf	6/2/2017	Work Request
LAZY T2N-R64W-S8 L01_FINAL PACKET	.pdf	6/2/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LAZY T2N-R64W-S8 L01_WALKDOWN	.pdf	5/30/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LAZY T2N-R64W-S8 L01_IR VERIFICATION	.pdf	5/30/2017	IR Verification Field Data Sheet
LAZY T2N-R64W-S8 L01_2080_NORMAL	.mp4	5/30/2017	IR Camera Video Normal Operations
LAZY T2N-R64W-S8 L01_2081_DUMP	.mp4	5/30/2017	IR Camera Video During Dump Event
LAZY T2N-R64W-S8 L01_2082_POST	.mp4	5/30/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LAZY T2N-R64W-S8 L01_SIGNED EVAL	.pdf	6/14/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** LAZY T2N-R64W-S8 L01

**Consent Decree Tank System Number:** 2146

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	2" & 3/4"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S	LEED 48" Gen 1 #7		
Number of Units	1	1		
Man. Capacity (MSCFD)	119	140		

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	5,376	5,377	0%
Calculated Burner Capacity (scfh)	6,698	10,792	
Headspace Surge Capacity (scfh)	0	0	
Total VCS Capacity (scfh)	6,698	10,792	
VCS Capacity minus PPIVF (scfh)	1,322	5,415	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 5/18/2018  
 Audit Document Review Verified by: \_\_\_\_\_ Patrick Dilsaver  
 Audit Document Verification Date: \_\_\_\_\_ 9/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LAZY T2N-R64W-S8 L01**

Consent Decree Tank System Number: **2146**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.80</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1259</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>111.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>12</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>4,640</b>	<b>4,640</b>
Oil Tank Working Rate	<b>499</b>	<b>498</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>5,377</b>	<b>5,376</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LAZY T2N-R64W-S8 L01**

Consent Decree Tank System Number: **2146**

**Audit Notes**

**Oil Dump Valve Size**

Job Sheet (Final Packet, pg 23) confirms a new LP separator was installed onsite which dumps to the oil tank. A 2" valve with 3/4" trim was used in the Engineering Evaluation, no documentation is provided to confirm this 2" valve was/is installed on the LP separator.

A 3/4" valve trim is confirmed using ITEM A1 in the STEM Walkdown Checklist (Final Packet, pg 29). ITEM A1 is checked "yes" indicating the oil dump trim is consistent with that used in the Engineering Evaluation and is therefore 3/4". For the given trim size, 3/4", a 2" valve is the largest valve size possible. A 2" valve was used in the Engineering Evaluation and therefore SLR can confirm the Modeling Guideline as being strictly applied.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS T6N-R65W-S25 L01**

Consent Decree Tank System Number: **85/1158**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_WALKDOWN	.pdf	3/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	4/13/2017	STEM Engineering Evaluation Spreadsheet
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_SIGNED EVAL	.pdf	4/17/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_Final Signed STEM Plan	.pdf	6/6/2017	Work Request
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_Final Signed STEM Plan	.pdf	6/6/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_WALKDOWN	.pdf	3/20/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_FINAL PACKET	.pdf	3/20/2017	IR Verification Field Data Sheet
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_1865_NORMAL	.mp4	3/15/2017	IR Camera Video Normal Operations
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_1866_DUMP	.mp4	3/15/2017	IR Camera Video During Dump Event
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_1867_POST	.mp4	3/15/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S25 L01 and NOFFSINGER T6N-R65W-S25 L01_SIGNED EVAL	.pdf	4/17/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS T6N-R65W-S25 L01**

Consent Decree Tank System Number: **85/1158**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>17,603</b>	<b>17,603</b>	
Total VCS Capacity (scfh)	<b>20,328</b>	<b>23,436</b>	
VCS Capacity minus PPIVF (scfh)	<b>15,820</b>	<b>18,927</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 4/10/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS T6N-R65W-S25 L01**

Consent Decree Tank System Number: **85/1158**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS T6N-R65W-S25 L01**

Consent Decree Tank System Number: **85/1158**

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did (did not) confirm the tank was "bottomed out "and the Walkdown Checklist was (was not) checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

Additional information was not provided to clarify the inconsistent and conflicting information, thus it is unknown whether the Engineering Design Standard was properly applied.

NEI Data Request Response:

Field verification for this facility was completed on or around 2/24/17, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS T6N-R65W-S34 L01**

Consent Decree Tank System Number: **2030**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S34 L01_FINAL PACKET	.pdf	8/18/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S34 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
LDS T6N-R65W-S34 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S34 L01_FINAL PACKET	.pdf	8/18/2015	Work Request
LDS T6N-R65W-S34 L01_FINAL PACKET	.pdf	8/18/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S34 L01_WALKDOWN	.pdf	8/10/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S34 L01_IR VERIFICATION	.pdf	8/12/2015	IR Verification Field Data Sheet
LDS T6N-R65W-S34 L01_0220_NORMAL	.mp4	8/12/2015	IR Camera Video Normal Operations
LDS T6N-R65W-S34 L01_0221_DUMP	.mp4	8/12/2015	IR Camera Video During Dump Event
LDS T6N-R65W-S34 L01_0222_POST	.mp4	8/12/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LDS T6N-R65W-S34 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** LDS T6N-R65W-S34 L01

**Consent Decree Tank System Number:** 2030

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>400</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>17,388</b>	<b>17,389</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>42,154</b>	<b>42,154</b>	
Total VCS Capacity (scfh)	<b>45,917</b>	<b>46,707</b>	
VCS Capacity minus PPIVF (scfh)	<b>28,529</b>	<b>29,318</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/18/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS T6N-R65W-S34 L01**

Consent Decree Tank System Number: **2030**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.80</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1437</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>162.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>5068</b>	<b>11381</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>20</b>	<b>46</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>28</b>	<b>64</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>17</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,753</b>	<b>6,753</b>
Oil Tank Working Rate	<b>569</b>	<b>568</b>
Water Tank Flash Rate	<b>2,741</b>	<b>2,741</b>
Water Tank Working Rate	<b>3,848</b>	<b>3,848</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>17,389</b>	<b>17,388</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS T6N-R65W-S34 L01**

Consent Decree Tank System Number: **2030**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 4-9) are not dated. Date assumed to be same as Facility Scouting Date (6/22/2015).

**2. Vapor Surge Vessel - Request additional data**

The Engineering Evaluation shows a vapor surge vessel onsite. However, no documentation is provided which indicates a vapor surge vessel existed previously or that one exists currently onsite. ITEM C13 of the STEM Walkdown Checklist (Final Packet, pg 17) is checked "yes" indicating the LP separator can produce into all tanks, indicating there is not a surge vessel onsite.

**Request verification from Noble of a vapor surge vessel onsite.**

**UPDATE 11/26/2018 - Noble provided documentation indicating one oil tank has been converted to a vapor surge vessel onsite. The Engineering Design Standard has been properly applied.**

**3. HP Separator Operating Pressure - Request additional data**

(1) HP separator and (1) LP separator exist onsite. QC Stem Checkout form (Final Packet, pg 23) and the automation support email (Final Packet, pg 24) confirm the LP separator has a max operating pressure of 70 psi.

Field datasheets (Final Packet, pg 7) show the HP separator onsite previously operating at 500 psi. The Engineering Evaluation indicates the HP separator is currently operating at 400 psi, which is standard pipeline pressure. No data required.

**4. Water Valve Dump Sizes - Request additional data**

The Engineering Evaluation shows both HP & LP water dumps to have a max trim size of 1". No documentation is provided to indicate the actual onsite trim size for the HP & LP water dumps. ITEM A2 of the STEM Walkdown Checklist (Final Packet, pg15) is checked "N/A", indicating it is unknown if the water dump trims are consistent with those used in the Engineering Evaluation.

**Request documentation of HP & LP separator water dump valve trim sizes.**

**NOBLE UPDATE - Field verification for this facility was completed on or around 11/20/2018, field verification confirmed that the valve trim size for the water dump valve is 1-inch.**

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS WHITE T3N-R64W-S17 L01**

Consent Decree Tank System Number: **1129**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LDS WHITE T3N-R64W-S17 L01_FINAL PACKET	.pdf	3/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LDS WHITE T3N-R64W-S17 L01_STEM Engineering Evaluation_rev1	.xlsm	3/20/2017	STEM Engineering Evaluation Spreadsheet
LDS WHITE T3N-R64W-S17 L01_SIGNED EVAL	.pdf	4/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LDS WHITE T3N-R64W-S17 L01_FINAL PACKET	.pdf	3/20/2017	Work Request
LDS WHITE T3N-R64W-S17 L01_FINAL PACKET	.pdf	3/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LDS WHITE T3N-R64W-S17 L01_WALKDOWN	.pdf	3/13/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LDS WHITE T3N-R64W-S17 L01_IR VERIFICATION	.pdf	3/13/2017	IR Verification Field Data Sheet
LDS WHITE T3N-R64W-S17 L01_1375_NORMAL	.mp4	3/13/2017	IR Camera Video Normal Operations
LDS WHITE T3N-R64W-S17 L01_1376_DUMP	.mp4	3/13/2017	IR Camera Video During Dump Event
LDS WHITE T3N-R64W-S17 L01_1377_POST	.mp4	3/13/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LDS WHITE T3N-R64W-S17 L01_SIGNED EVAL	.pdf	4/12/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS WHITE T3N-R64W-S17 L01**

Consent Decree Tank System Number: **1129**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,123</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>291</b>	<b>346</b>	
Total VCS Capacity (scfh)	<b>4,414</b>	<b>4,946</b>	
VCS Capacity minus PPIVF (scfh)	<b>970</b>	<b>1,359</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 5/15/2018  
 Audit Document Review Verified by: \_\_\_\_\_ Kenny Malmquist  
 Audit Document Verification Date: \_\_\_\_\_ 9/4/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS WHITE T3N-R64W-S17 L01**

Consent Decree Tank System Number: **1129**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LDS WHITE T3N-R64W-S17 L01**

Consent Decree Tank System Number: **1129**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 11-16) are not dated. Date assumed to be same as Facility Scouting Date (9/14/2016).

**2. Diameter of VOC lines**

The Engineering Evaluation shows (1) 3" VOC line from tanks to KO and (1) 3" line from KO to burner. Field Datasheet (Final Packet, pg 12) show a 3" VOC line from tanks to KO and the Field Datasheet (Final Packet, pg 15) shows a 2" VOC line from KO to burner.

There is not a work request provided in the documentation which shows a requested VOC line change from 2" to 3". Therefore SLR is assuming the 2" VOC line from KO to burner still exists onsite.

**3. Oil Dump Valve Size - Unknown**

Field Datasheet (Final Packet, pg 14) shows the separator onsite originally had a 2" oil dump valve with unknown trim size. **ITEM A1 of the STEM Walkdown Checklist is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation.**

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, ½", a 2" valve could be installed and therefore the modeling guideline cannot be confirmed as being followed. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**4. Tank Fill Level**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LEE BOIKO T4N-R65W-S15 L01**

Consent Decree Tank System Number: **143**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LEE BOIKO T4N-R65W-S15 L01_FINAL PACKET	.pdf	10/27/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LEE BOIKO T4N-R65W-S15 L01_STEM Engineering Evaluation_rev1	.xlsm	12/1/2016	STEM Engineering Evaluation Spreadsheet
LEE BOIKO T4N-R65W-S15 L01_Final Signed STEM Plan	.pdf	1/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LEE BOIKO T4N-R65W-S15 L01_FINAL PACKET	.pdf	10/27/2017	Work Request
LEE BOIKO T4N-R65W-S15 L01_FINAL PACKET	.pdf	10/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LEE BOIKO T4N-R65W-S15 L01_WALKDOWN	.pdf	2/12/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LEE BOIKO T4N-R65W-S15 L01_IR VERIFICATION	.pdf	11/22/2016	IR Verification Field Data Sheet
LEE BOIKO T4N-R65W-S15 L01_1726_NORMAL	.mp4	11/21/2016	IR Camera Video Normal Operations
LEE BOIKO T4N-R65W-S15 L01_1727_DUMP	.mp4	11/21/2016	IR Camera Video During Dump Event
LEE BOIKO T4N-R65W-S15 L01_1728_POST	.mp4	11/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LEE BOIKO T4N-R65W-S15 L01_SIGNED EVAL	.pdf	12/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LEE BOIKO T4N-R65W-S15 L01**

Consent Decree Tank System Number: **143**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>16,109</b>	<b>16,109</b>	
Total VCS Capacity (scfh)	<b>20,164</b>	<b>20,709</b>	
VCS Capacity minus PPIVF (scfh)	<b>15,418</b>	<b>15,962</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 3/5/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 5/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LEE BOIKO T4N-R65W-S15 L01**

Consent Decree Tank System Number: **143**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LEE BOIKO T4N-R65W-S15 L01**

Consent Decree Tank System Number: **143**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LEHFELDT HERBST T4N-R64W-S27 L02**

Consent Decree Tank System Number: **480**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LEHFELDT HERBST T4N-R64W-S27 L02_FINAL PACKET	.pdf	5/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LEHFELDT HERBST T4N-R64W-S27 L02_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/26/2016	STEM Engineering Evaluation Spreadsheet
LEHFELDT HERBST T4N-R64W-S27 L02_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LEHFELDT HERBST T4N-R64W-S27 L02_FINAL PACKET	.pdf	5/26/2016	Work Request
LEHFELDT HERBST T4N-R64W-S27 L02_FINAL PACKET	.pdf	5/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LEHFELDT HERBST T4N-R64W-S27 L02_WALKDOWN	.pdf	5/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LEHFELDT HERBST T4N-R64W-S27 L02_IR VERIFICATION	.pdf	5/26/2016	IR Verification Field Data Sheet
LEHFELDT HERBST T4N-R64W-S27 L02_1074_NORMAL	.mp4	5/24/2016	IR Camera Video Normal Operations
LEHFELDT HERBST T4N-R64W-S27 L02_1075_DUMP	.mp4	5/24/2016	IR Camera Video During Dump Event
LEHFELDT HERBST T4N-R64W-S27 L02_1076_POST	.mp4	5/24/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LEHFELDT HERBST T4N-R64W-S27 L02_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LEHFELDT HERBST T4N-R64W-S27 L02**

Consent Decree Tank System Number: **480**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>11,782</b>	<b>11,783</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,716</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>25,988</b>	<b>25,988</b>	
Total VCS Capacity (scfh)	<b>29,704</b>	<b>30,541</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,922</b>	<b>18,758</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/14/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LEHFELDT HERBST T4N-R64W-S27 L02**

Consent Decree Tank System Number: **480**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94	0.94						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>l</sup>	238	0
Mscfd	29	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	2,527	2,527

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	11,783	11,782
-------	--------	--------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LEHFELDT HERBST T4N-R64W-S27 L02**

Consent Decree Tank System Number: **480**

**Audit Notes**

Separator 3 (Lehfeldt C27-25) initially has a 2" 212 SMA valve per the Field Data Sheet (LEHFELDT HERBST T4N-R64W-S27 L02\_FINAL PACKET.pdf, pg 16). Job Sheet (LEHFELDT HERBST T4N-R64W-S27 L02\_FINAL PACKET.pdf, pg 25) confirms it was changed to a 1/2" trim, however, there is no documentation confirming that the valve itself was swapped with the 1" 1400 SMA. SLR assumes the valve was changed because a 212 SMA cannot utilize an alternate trim size.

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

Additional information is needed to confirm the conflicting information regarding the conversion of a storage tank to a vapor headspace tank.

NEI Data Request Response:

Field verification for this facility was completed on or around 5/3/2016, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LETTERLY T7N-R64W-S23 L01**

Consent Decree Tank System Number: **574**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LETTERLY T7N-R64W-S23 L01_FINAL PACKET	.pdf	9/21/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LETTERLY T7N-R64W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	12/21/2017	STEM Engineering Evaluation Spreadsheet
LETTERLY T7N-R64W-S23 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LETTERLY T7N-R64W-S23 L01_FINAL PACKET / LETTERLY T7N-R64W-S23 L01_COMPLETED TLO	.pdf	9/21/2015 / 6/22/2016	Work Request
LETTERLY T7N-R64W-S23 L01_FINAL PACKET / LETTERLY T7N-R64W-S23 L01_COMPLETED TLO	.pdf	9/21/2015 / 6/22/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LETTERLY T7N-R64W-S23 L01_WALKDOWN	.pdf	9/21/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LETTERLY T7N-R64W-S23 L01_IR VERIFICATION	.pdf	9/18/2015	IR Verification Field Data Sheet
LETTERLY T7N-R64W-S23 L01_0278_NORMAL	.mp4	9/17/2015	IR Camera Video Normal Operations
LETTERLY T7N-R64W-S23 L01_0279_DUMP	.mp4	9/17/2015	IR Camera Video During Dump Event
LETTERLY T7N-R64W-S23 L01_0280_POST	.mp4	9/17/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LETTERLY T7N-R64W-S23 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LETTERLY T7N-R64W-S23 L01**

Consent Decree Tank System Number: **574**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>8</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>16,702</b>	<b>16,704</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,059</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>102,827</b>	<b>102,827</b>	
Total VCS Capacity (scfh)	<b>107,886</b>	<b>114,494</b>	
VCS Capacity minus PPIVF (scfh)	<b>91,184</b>	<b>97,790</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/10/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/10/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LETTERLY T7N-R64W-S23 L01**

Consent Decree Tank System Number: **574**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>46</b>	<b>0</b>

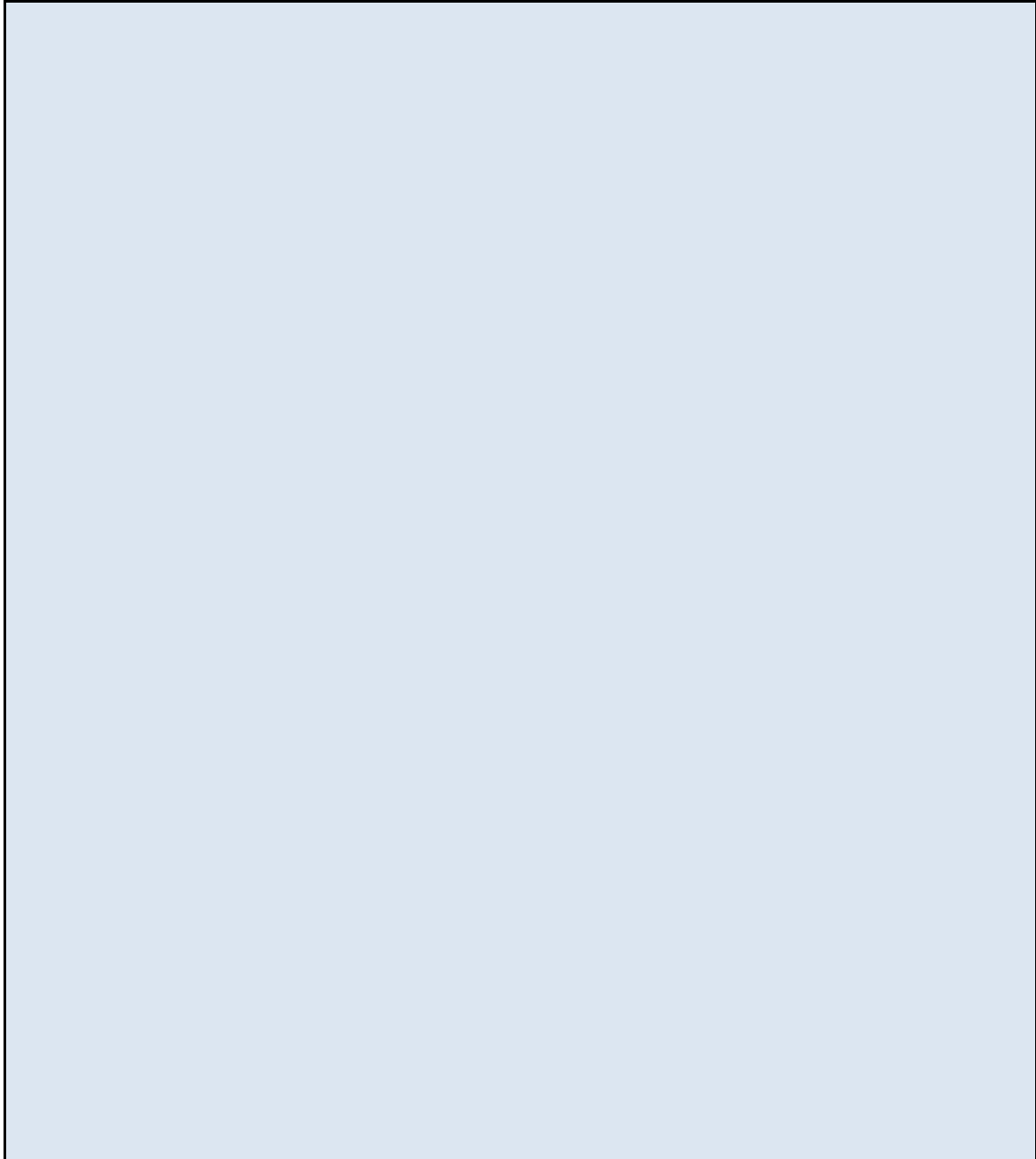
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,902</b>	<b>1,902</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>16,704</b>	<b>16,702</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LETTERLY T7N-R64W-S23 L01**

Consent Decree Tank System Number: **574**

**Audit Notes**





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LF RANCH GUTTERSEN USX T4N-R63W-S9 L01**

Consent Decree Tank System Number: **1351**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_FINAL PACKET	.pdf	1/18/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_FINAL PACKET	.pdf	1/18/2016	Work Request
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_FINAL PACKET	.pdf	1/18/2016	Construction Jobsheets
2018 Draft Attachements to Comment Letter	.pdf	1/4/2018	Rework Request

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_WALKDOWN	.pdf	1/12/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_IR VERIFICATION	.pdf	1/14/2016	IR Verification Field Data Sheet
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_0596_NORMAL	.mp4	1/14/2016	IR Camera Video Normal Operations
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_0597_DUMP	.mp4	1/14/2016	IR Camera Video During Dump Event
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_0598_POST	.mp4	1/14/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S9 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LF RANCH GUTTERSEN USX T4N-R63W-S9 L01**

**Consent Decree Tank System Number:** **1351**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,483</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>1,290</b>	<b>1,290</b>	
Total VCS Capacity (scfh)	<b>4,773</b>	<b>6,248</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,468</b>	<b>2,942</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Angela M. Oberlander and James Van Horne  
 Audit Document Verification Date: 9/6/2018 and 7/6/2020



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LF RANCH GUTTERSEN USX T4N-R63W-S9 L01**

Consent Decree Tank System Number: **1351**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LF RANCH GUTTERSEN USX T4N-R63W-S9 L01**

Consent Decree Tank System Number: **1351**

**Audit Notes**

The STEM Work Request indicates the PSHH is to be set to 65 psig. The Job Sheet indicates the Versa and Fisher 4660 have been set to 65 psig. The signed Engineering Evaluation and the Engineering Evaluation spreadsheet have a maximum pressure of 55 psig. A rework request dated 1/4/2018 provided by Noble in response to the draft audit report confirms that the Versa and Fisher 4660 have been set to 55 psig.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LF RANCH GUTTERSEN USX T4N-R63W-S17 L03**

**Consent Decree Tank System Number:** **1488**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_FINAL PACKET	.pdf	12/23/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_STEM Engineering Evaluation_rev1	.xlsm	6/27/2014	STEM Engineering Evaluation Spreadsheet
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_FINAL PACKET	.pdf	7/30/2015	Work Request
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_FINAL PACKET	.pdf	11/24/2015	Construction Jobsheets
SLR_Noble_CD Data Request 4_Noble Response_20181114	.xlsx	11/14/2018	Data Request Response

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_WALKDOWN	.pdf	12/22/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_IR VERIFICATION	.pdf	12/22/2015	IR Verification Field Data Sheet
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_0547_NORMAL	.mp4	12/22/2015	IR Camera Video Normal Operations
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_0548_DUMP	.mp4	12/22/2015	IR Camera Video During Dump Event
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_0549_POST	.mp4	12/22/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LF RANCH GUTTERSEN USX T4N-R63W-S17 L03_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LF RANCH GUTTERSEN USX T4N-R63W-S17 L03**

**Consent Decree Tank System Number:** **1488**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>4,006</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,219</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>405</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,624</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>779</b>	<b>594</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/30/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LF RANCH GUTTERSEN USX T4N-R63W-S17 L03**

Consent Decree Tank System Number: **1488**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,454</b>	<b>3,307</b>
Oil Tank Working Rate	<b>314</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,006</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LF RANCH GUTTERSEN USX T4N-R63W-S17 L03**

Consent Decree Tank System Number: **1488**

**Audit Notes**

The Work Request, pg. 3, and the Job Sheet, pg. 19, indicate a new HLP Separator was installed on-site and the HP dumps routed to the new Separator. The new LP separator oil dump valve body size is not indicated within the provided documentation. The LP Separator dump valve trim size is confirmed as 1/2" per the Walkdown Checklist, Item A1. Valve sizing was not confirmed, so the largest valve size with the given trim was used to evaluate adequacy of design/ VCS capacity. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The work request (FINAL PACKET p. 3) states that the VOC line from the tank to the KO needs to be changed from 2" to 3". There is no verification that this work was completed. The data request response delivered on November 14, 2018 Noble states "Field verification for this facility was completed on or around 12/2/2015, field verification confirmed that the 3" VOC line from the tank to the KO was installed."

The tank system consists of a single oil tank. The signed evaluation states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LIGGETT SATER T4N-R63W-S18 L01**

Consent Decree Tank System Number: **461/460/811**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_FINAL PACKET	.pdf	9/2/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	9/16/2016	STEM Engineering Evaluation Spreadsheet
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_FINAL PACKET	.pdf	9/2/2016	Work Request
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_FINAL PACKET	.pdf	9/2/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_WALKDOWN	.pdf	8/31/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_IR VERIFICATION	.pdf	8/31/2016	IR Verification Field Data Sheet
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_1449_NORMAL	.mp4	8/31/2016	IR Camera Video Normal Operations
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_1450_DUMP	.mp4	8/31/2016	IR Camera Video During Dump Event
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_1451_POST	.mp4	8/31/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LIGGETT SATER T4N-R63W-S18 L01 & WATKINS SATER T4N-R63W-S18 L02 & WATKINS T4N-R63W-S18 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LIGGETT SATER T4N-R63W-S18 L01**

**Consent Decree Tank System Number:** **461/460/811**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,775</b>	<b>1,906</b>	
Total VCS Capacity (scfh)	<b>5,956</b>	<b>6,506</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,275</b>	<b>2,681</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 8/1/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/19/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LIGGETT SATER T4N-R63W-S18 L01**

Consent Decree Tank System Number: **461/460/811**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_r$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LIGGETT SATER T4N-R63W-S18 L01**

Consent Decree Tank System Number: **461/460/811**

**Audit Notes**

The STEM Work Request indicated the 2" VOC line on the top of the oil storage tanks to the KO pot was to be replaced with a 3" line. There is no confirmation that the piping modification occurred. The Engineering Evaluation was completed with a 3" NPS for this section of pipe.

Noble provided information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 8/4/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed." The Engineering Design Standard was appropriately applied based on the provided field verification information.

The Work Request indicated the oil dump valve on the HLP Separator was to be modified from a Kimray 212 SMA to a Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve was modified with the documentation provided. The Walkdown Checklist, Item A1 indicates the oil dump trims are consistent with the Engineering Evaluation. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LILLI UNIT T8N-R59W-S1 L01**

Consent Decree Tank System Number: **1690**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LILLI UNIT T8N-R59W-S1 L01_FINAL PACKET	.pdf	7/26/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LILLI UNIT T8N-R59W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	7/26/2017	STEM Engineering Evaluation Spreadsheet
LILLI UNIT T8N-R59W-S1 L01_SIGNED EVAL	.pdf	7/27/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LILLI UNIT T8N-R59W-S1 L01_FINAL PACKET	.pdf	7/26/2017	Work Request
LILLI UNIT T8N-R59W-S1 L01_FINAL PACKET	.pdf	7/26/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LILLI UNIT T8N-R59W-S1 L01_WALKDOWN	.pdf	Unknown	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LILLI UNIT T8N-R59W-S1 L01_IR VERIFICATION	.pdf	7/24/2017	IR Verification Field Data Sheet
LILLI UNIT T8N-R59W-S1 L01_2163_NORMAL	.mp4	7/24/2017	IR Camera Video Normal Operations
LILLI UNIT T8N-R59W-S1 L01_2164_DUMP	.mp4	7/24/2017	IR Camera Video During Dump Event
LILLI UNIT T8N-R59W-S1 L01_2165_POST	.mp4	7/24/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LILLI UNIT T8N-R59W-S1 L01_SIGNED EVAL	.pdf	7/27/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** LILLI UNIT T8N-R59W-S1 L01

**Consent Decree Tank System Number:** 1690

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>210</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 1" (ro)</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>74,014</b>	<b>72,798</b>	<b>-2%</b>
Calculated Burner Capacity (scfh)	<b>2,830</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>212,569</b>	<b>212,569</b>	
Total VCS Capacity (scfh)	<b>215,399</b>	<b>217,527</b>	
VCS Capacity minus PPIVF (scfh)	<b>141,385</b>	<b>144,729</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 9/5/2018 & 11/26/2018  
 Audit Document Review Verified by: K. Malmquist  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LILLI UNIT T8N-R59W-S1 L01**

Consent Decree Tank System Number: **1690**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.88</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>2.00</b>							
Gas/Oil Ratio (scf/bbl)	<b>453.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>17.60</b>							
Critical Pressure (psia) <sup>b</sup>	<b>664</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>223</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.80</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3710</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1681.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>35</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>317</b>	<b>0</b>
Mscfd	<b>30</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>70,060</b>	<b>71,254</b>
Oil Tank Working Rate	<b>1,470</b>	<b>1,492</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,268</b>	<b>1,268</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>72,798</b>	<b>74,014</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LILLI UNIT T8N-R59W-S1 L01**

Consent Decree Tank System Number: **1690**

**Audit Notes**

**1.) Disposition of LP gas unknown - Field Datasheet incomplete**

The Field Datasheets (Final Packet, pp. 9 and 12) indicate there were two (2) vertical separators and a single Leed tank burner originally onsite, but the disposition of the oil outlets and LP gas is not indicated on the sheets. The Job Sheet (Final Packet, pg 19) states "[r]eplaced Leed tank burner with new Leed [burner]," and "Installed 1 inch orifice plate downstream of 3" LP heater treater oil dump valve." The signed Engineering Evaluation indicates one (1) HP separator dumps to the tanks. Since there is only one burner, the disposition of the LP gas is important. If the LP gas is routed to the tank burner, the Modeling Guideline and Engineering Evaluation is impacted. It appears based on the Field Datasheets that a vertical HP separator (two-phase?) dumps liquids to HP treater, but confirmation should be provided.

**REQUEST DOCUMENTATION OF DISPOSITION OF LP GAS (i.e., sales or LP gas to tank burner) AND HP SEPARATOR OIL.**

**UPDATE 11/26/2018 - Noble's response to data request... "Engineering review was completed on or around 10/4/2018, engineering review confirmed that the LILLI UNIT T8N-R59W-S1 L01 operates as HP-LP, because there is no LP gas header, and the operating pressure limit is imposed on the HP separator, the evaluation is written up as an HP-only design."**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOFLAND BILLY T5N-R65W-S22 L01**

Consent Decree Tank System Number: **1758**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LOFLAND BILLY T5N-R65W-S22 L01_FINAL PACKET	.pdf	8/30/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LOFLAND BILLY T5N-R65W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	9/1/2016	STEM Engineering Evaluation Spreadsheet
LOFLAND BILLY T5N-R65W-S22 L01_SIGNED EVAL	.pdf	9/6/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LOFLAND BILLY T5N-R65W-S22 L01_FINAL PACKET	.pdf	8/30/2016	Work Request
LOFLAND BILLY T5N-R65W-S22 L01_FINAL PACKET	.pdf	8/30/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LOFLAND BILLY T5N-R65W-S22 L01_WALKDOWN	.pdf	9/6/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LOFLAND BILLY T5N-R65W-S22 L01_IR VERIFICATION	.pdf	8/26/2016	IR Verification Field Data Sheet
LOFLAND BILLY T5N-R65W-S22 L01_1440_NORMAL	.mp4	8/25/2016	IR Camera Video Normal Operations
LOFLAND BILLY T5N-R65W-S22 L01_1443_DUMP	.mp4	8/25/2016	IR Camera Video During Dump Event
LOFLAND BILLY T5N-R65W-S22 L01_1444_POST	.mp4	8/25/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LOFLAND BILLY T5N-R65W-S22 L01_SIGNED EVAL	.pdf	9/6/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LOFLAND BILLY T5N-R65W-S22 L01**

**Consent Decree Tank System Number:** **1758**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,926</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>1,699</b>	<b>1,838</b>	
Total VCS Capacity (scfh)	<b>5,625</b>	<b>6,796</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,944</b>	<b>2,971</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/14/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOFLAND BILLY T5N-R65W-S22 L01**

Consent Decree Tank System Number: **1758**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOFLAND BILLY T5N-R65W-S22 L01**

Consent Decree Tank System Number: **1758**

**Audit Notes**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.  
NEI Data Request Response:

The specific valve size/type is not a critical aspect of the design. Field verification of the valve size would not impact the adequacy of design determination, as the typical design targets 20-30% contingency.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOLOFF T5N-R64W-S35 L05**

Consent Decree Tank System Number: **443**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LOLOFF T5N-R64W-S35 L05_FINAL PACKET	.pdf	3/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LOLOFF T5N-R64W-S35 L05_STEM Engineering Evaluation_rev1	.xlsm	3/18/2016	STEM Engineering Evaluation Spreadsheet
LOLOFF T5N-R64W-S35 L05_SIGNED EVAL	.pdf	3/28/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LOLOFF T5N-R64W-S35 L05_FINAL PACKET	.pdf	3/16/2016	Work Request
LOLOFF T5N-R64W-S35 L05_FINAL PACKET	.pdf	3/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LOLOFF T5N-R64W-S35 L05_WALKDOWN	.pdf	3/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LOLOFF T5N-R64W-S35 L05_IR VERIFICATION	.pdf	3/16/2016	IR Verification Field Data Sheet
LOLOFF T5N-R64W-S35 L05_0765_NORMAL	.mp4	3/14/2016	IR Camera Video Normal Operations
LOLOFF T5N-R64W-S35 L05_0766_DUMP	.mp4	3/14/2016	IR Camera Video During Dump Event
LOLOFF T5N-R64W-S35 L05_0767_POST	.mp4	3/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LOLOFF T5N-R64W-S35 L05_SIGNED EVAL	.pdf	3/28/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LOLOFF T5N-R64W-S35 L05**

**Consent Decree Tank System Number:** **443**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>29,616</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>2,369</b>	<b>2,369</b>	
Total VCS Capacity (scfh)	<b>31,985</b>	<b>12,802</b>	
VCS Capacity minus PPIVF (scfh)	<b>27,903</b>	<b>8,719</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/11/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/6/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOLOFF T5N-R64W-S35 L05**

Consent Decree Tank System Number: **443**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOLOFF T5N-R64W-S35 L05**

Consent Decree Tank System Number: **443**

**Audit Notes**

The walkdown checklist (LOLOFF T5N-R64W-S35 L05\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (LOLOFF T5N-R64W-S35 L05\_FINAL PACKET) where applicable.

This site was selected for an additional IR camera inspection because the footage was very shaky.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LORENZ FMS T5N-R65W-S22 L01**

Consent Decree Tank System Number: **887**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LORENZ FMS T5N-R65W-S22 L01_FINAL PACKET	.pdf	11/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LORENZ FMS T5N-R65W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	4/7/2016	STEM Engineering Evaluation Spreadsheet
LORENZ FMS T5N-R65W-S22 L01_SIGNED EVAL	.pdf	4/13/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LORENZ FMS T5N-R65W-S22 L01_FINAL PACKET	.pdf	12/14/2015	Work Request
LORENZ FMS T5N-R65W-S22 L01_FINAL PACKET	.pdf	3/4/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LORENZ FMS T5N-R65W-S22 L01_WALKDOWN	.pdf	3/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LORENZ FMS T5N-R65W-S22 L01_IR VERIFICATION	.pdf	3/29/2016	IR Verification Field Data Sheet
LORENZ FMS T5N-R65W-S22 L01_0322_NORMAL	.mp4	3/28/2016	IR Camera Video Normal Operations
LORENZ FMS T5N-R65W-S22 L01_0323_DUMP	.mp4	3/28/2016	IR Camera Video During Dump Event
LORENZ FMS T5N-R65W-S22 L01_0324_POST	.mp4	3/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LORENZ FMS T5N-R65W-S22 L01_SIGNED EVAL	.pdf	4/13/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LORENZ FMS T5N-R65W-S22 L01**

**Consent Decree Tank System Number:** **887**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,244</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,298</b>	<b>2,298</b>	
Total VCS Capacity (scfh)	<b>5,850</b>	<b>6,898</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,768</b>	<b>2,654</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver

Audit Document Review Date: 3/29/2018

Audit Document Review Verified by: Angela M. Oberlander

Audit Document Verification Date: 4/3/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LORENZ FMS T5N-R65W-S22 L01**

Consent Decree Tank System Number: **887**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (C)	7.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	794							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	82.9							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,454	3,307
Oil Tank Working Rate	314	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	4,244	4,082

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LORENZ FMS T5N-R65W-S22 L01**

Consent Decree Tank System Number: **887**

**Audit Notes**

1. The Work Request, pg. 3, and the Job Sheet, pg. 21, indicate a new LP Separator was installed on-site and the HP dumps routed to the new Separator. The new LP separator oil dump valve body size is not indicated within the provided documentation. The LP Separator dump valve trim size is confirmed as 1/2" per the Walkdown Checklist, Item A1.

Valve sizing was not confirmed, so the largest valve size with the given trim was used to evaluate adequacy of design/ VCS capacity.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET JOHNSON T4N-R64W-S30 L01**

Consent Decree Tank System Number: **1759**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LOUSTALET JOHNSON T4N-R64W-S30 L01_FINAL PACKET	.pdf	2/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET JOHNSON T4N-R64W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	3/23/2018	STEM Engineering Evaluation Spreadsheet
LOUSTALET JOHNSON T4N-R64W-S30 L01_SIGNED EVAL	.pdf	3/28/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET JOHNSON T4N-R64W-S30 L01_FINAL PACKET	.pdf	2/24/2016	Work Request
LOUSTALET JOHNSON T4N-R64W-S30 L01_FINAL PACKET	.pdf	2/24/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET JOHNSON T4N-R64W-S30 L01_WALKDOWN	.pdf	2/24/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET JOHNSON T4N-R64W-S30 L01_IR VERIFICATION	.pdf	2/22/2016	IR Verification Field Data Sheet
LOUSTALET JOHNSON T4N-R64W-S30 L01_0712_NORMAL	.mp4	2/19/2016	IR Camera Video Normal Operations
LOUSTALET JOHNSON T4N-R64W-S30 L01_0713_DUMP	.mp4	2/19/2016	IR Camera Video During Dump Event
LOUSTALET JOHNSON T4N-R64W-S30 L01_0714_POST	.mp4	2/19/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET JOHNSON T4N-R64W-S30 L01_SIGNED EVAL	.pdf	3/28/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LOUSTALET JOHNSON T4N-R64W-S30 L01**

**Consent Decree Tank System Number:** **1759**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>588</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,615</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>770</b>	<b>1,113</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET JOHNSON T4N-R64W-S30 L01**

Consent Decree Tank System Number: **1759**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,845</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET JOHNSON T4N-R64W-S30 L01**

Consent Decree Tank System Number: **1759**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET T4N-R64W-S30 L02**

Consent Decree Tank System Number: **1831**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LOUSTALET T4N-R64W-S30 L02_FINAL PACKET	.pdf	8/11/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T4N-R64W-S30 L02_STEM Engineering Evaluation_rev1	.xlsm	9/21/2017	STEM Engineering Evaluation Spreadsheet
LOUSTALET T4N-R64W-S30 L02_SIGNED EVAL	.pdf	8/21/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T4N-R64W-S30 L02_FINAL PACKET	.pdf	8/11/2017	Work Request
LOUSTALET T4N-R64W-S30 L02_FINAL PACKET	.pdf	8/11/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T4N-R64W-S30 L02_WALKDOWN	.pdf	8/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T4N-R64W-S30 L02_IR VERIFICATION	.pdf	8/10/2017	IR Verification Field Data Sheet
LOUSTALET T4N-R64W-S30 L02_2269_NORMAL	.mp4	8/10/2017	IR Camera Video Normal Operations
LOUSTALET T4N-R64W-S30 L02_2270_DUMP	.mp4	8/10/2017	IR Camera Video During Dump Event
LOUSTALET T4N-R64W-S30 L02_2271_POST	.mp4	8/10/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T4N-R64W-S30 L02_SIGNED EVAL	.pdf	8/21/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** LOUSTALET T4N-R64W-S30 L02

**Consent Decree Tank System Number:** 1831

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	60							
Dump Valve Size & Trim Size (in)	2" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,444	3,587	4%
Calculated Burner Capacity (scfh)	4,027	4,958	
Headspace Surge Capacity (scfh)	0	0	
Total VCS Capacity (scfh)	4,027	4,958	
VCS Capacity minus PPIVF (scfh)	583	1,371	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 5/21/2018

Audit Document Review Verified by: Patrick Dilsaver

Audit Document Verification Date: 9/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET T4N-R64W-S30 L02**

Consent Decree Tank System Number: **1831**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET T4N-R64W-S30 L02**

Consent Decree Tank System Number: **1831**

**Audit Notes**

**Unknown Oil Dump Valve Size**

Job Sheet (Final Packet, pg 22) confirms a new LP separator was installed onsite and dumps to the tank. A 1" oil dump valve with 1/2" trim was used in the Engineering Evaluation. ITEM A1 of the STEM Walkdown Checklist is checked "yes", indicating a 1/2" oil dump trim size is currently installed on the LP separator onsite.

No documentation is provided to confirm a 1" oil dump valve was/is installed on the LP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET T5N-R65W-S12 L01**

Consent Decree Tank System Number: **1826**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LOUSTALET T5N-R65W-S12 L01_FINAL PACKET	.pdf	2/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T5N-R65W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	11/18/2016	STEM Engineering Evaluation Spreadsheet
LOUSTALET T5N-R65W-S12 L01_SIGNED EVAL	.pdf	11/30/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T5N-R65W-S12 L01_FINAL PACKET	.pdf	9/6/2016	Work Request
LOUSTALET T5N-R65W-S12 L01_FINAL PACKET	.pdf	10/21/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T5N-R65W-S12 L01_WALKDOWN	.pdf	11/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T5N-R65W-S12 L01_IR VERIFICATION	.pdf	11/17/2016	IR Verification Field Data Sheet
LOUSTALET T5N-R65W-S12 L01_1720_NORMAL	.mp4	11/17/2016	IR Camera Video Normal Operations
LOUSTALET T5N-R65W-S12 L01_1721_DUMP	.mp4	11/17/2016	IR Camera Video During Dump Event
LOUSTALET T5N-R65W-S12 L01_1722_POST	.mp4	11/17/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LOUSTALET T5N-R65W-S12 L01_SIGNED EVAL	.pdf	11/30/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET T5N-R65W-S12 L01**

Consent Decree Tank System Number: **1826**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,953</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>230</b>	<b>230</b>	
Total VCS Capacity (scfh)	<b>4,183</b>	<b>5,188</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,115</b>	<b>1,994</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:	Patrick Dilsaver
Audit Document Review Date:	3/29/2018
Audit Document Review Verified by:	Angela M. Oberlander
Audit Document Verification Date:	4/3/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET T5N-R65W-S12 L01**

Consent Decree Tank System Number: **1826**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51							
Z2	-0.86							
Z3	0.98							
Z	0.62							
Gas/Oil Ratio (scf/bbl)	88.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20							
Critical Pressure (psia) <sup>b</sup>	526							
Vapor Pressure (psia) <sup>c</sup>	68							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	725							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	64.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,670	2,556
Oil Tank Working Rate	287	274
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	3,195	3,068

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTALET T5N-R65W-S12 L01**

Consent Decree Tank System Number: **1826**

**Audit Notes**

1. The Work Request, pg. 3, and the Job Sheet, pg. 37, indicate a new LP Separator was installed on-site and the HP dumps routed to the new Separator. The new LP separator oil dump valve body size is not indicated within the provided documentation. The LP Separator dump valve trim size is confirmed as 1/2" per the Walkdown Checklist, Item A1.

Valve sizing was not confirmed, so the largest valve size with the given trim was used to evaluate adequacy of design/ VCS capacity.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTELET GLOVER USX T5N-R64W-S15 L01**

Consent Decree Tank System Number: **309**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LOUSTELET GLOVER USX T5N-R64W-S15 L01_FINAL PACKET	.pdf	1/5/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LOUSTELET GLOVER USX T5N-R64W-S15 L01_STEM Engineering Evaluation_rev1	.xlsm	6/14/2017	STEM Engineering Evaluation Spreadsheet
LOUSTELET GLOVER USX T5N-R64W-S15 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LOUSTELET GLOVER USX T5N-R64W-S15 L01_FINAL PACKET	.pdf	1/5/2016	Work Request
LOUSTELET GLOVER USX T5N-R64W-S15 L01_FINAL PACKET	.pdf	1/5/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LOUSTELET GLOVER USX T5N-R64W-S15 L01_WALKDOWN	.pdf	1/5/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LOUSTELET GLOVER USX T5N-R64W-S15 L01_IR VERIFICATION	.pdf	1/5/2016	IR Verification Field Data Sheet
LOUSTELET GLOVER USX T5N-R64W-S15 L01_0561_NORMAL	.mp4	1/4/2016	IR Camera Video Normal Operations
LOUSTELET GLOVER USX T5N-R64W-S15 L01_0562_DUMP	.mp4	1/4/2016	IR Camera Video During Dump Event
LOUSTELET GLOVER USX T5N-R64W-S15 L01_0563_POST	.mp4	1/4/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LOUSTELET GLOVER USX T5N-R64W-S15 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LOUSTELET GLOVER USX T5N-R64W-S15 L01**

**Consent Decree Tank System Number:** **309**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>110</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,932</b>	<b>8,933</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,147</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>11,125</b>	<b>11,125</b>	
Total VCS Capacity (scfh)	<b>15,272</b>	<b>17,667</b>	
VCS Capacity minus PPIVF (scfh)	<b>6,340</b>	<b>8,734</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/26/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTELET GLOVER USX T5N-R64W-S15 L01**

Consent Decree Tank System Number: **309**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.25</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.37</b>							
Gas/Oil Ratio (scf/bbl)	<b>188.3</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>575</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>123</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1026</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>193.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>10</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>8,051</b>	<b>8,051</b>
Oil Tank Working Rate	<b>407</b>	<b>406</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>8,933</b>	<b>8,932</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOUSTELET GLOVER USX T5N-R64W-S15 L01**

Consent Decree Tank System Number: **309**

**Audit Notes**

The separator on location has pressure controlled by a pneumatic controller. The initial provided documentation did not confirm that the controller shut-in pressure for the HP Separator was set to 110 psig as requested in the STEM Work Request dated 9/23/2015.

The separator pneumatic PSHH is set by the operator, not automation personnel, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states the separator cannot operate above 110 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation. It was determined the Modeling Guidelines were appropriately applied based on the administrative use of the One-Pager.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOVELACE T7N-R63W-S32 L01**

Consent Decree Tank System Number: **1668**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LOVELACE T7N-R63W-S32 L01_FINAL PACKET	.pdf	6/9/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LOVELACE T7N-R63W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	6/14/2017	STEM Engineering Evaluation Spreadsheet
LOVELACE T7N-R63W-S32 L01_SIGNED EVAL	.pdf	6/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LOVELACE T7N-R63W-S32 L01_FINAL PACKET	.pdf	6/9/2017	Work Request
LOVELACE T7N-R63W-S32 L01_FINAL PACKET	.pdf	6/9/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LOVELACE T7N-R63W-S32 L01_WALKDOWN	.pdf	6/9/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LOVELACE T7N-R63W-S32 L01_IR VERIFICATION	.pdf	6/8/2017	IR Verification Field Data Sheet
LOVELACE T7N-R63W-S32 L01_2096_NORMAL	.mp4	6/1/2017	IR Camera Video Normal Operations
LOVELACE T7N-R63W-S32 L01_2097_DUMP	.mp4	6/1/2017	IR Camera Video During Dump Event
LOVELACE T7N-R63W-S32 L01_2098_POST	.mp4	6/1/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LOVELACE T7N-R63W-S32 L01_SIGNED EVAL	.pdf	6/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOVELACE T7N-R63W-S32 L01**

Consent Decree Tank System Number: **1668**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>475</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,502</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,058</b>	<b>1,371</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/11/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/6/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOVELACE T7N-R63W-S32 L01**

Consent Decree Tank System Number: **1668**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_T$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_T$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LOVELACE T7N-R63W-S32 L01**

**Consent Decree Tank System Number:** **1668**

**Audit Notes**

The walkdown checklist (LOVELACE T7N-R63W-S32 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (LOVELACE T7N-R63W-S32 L01\_FINAL PACKET) where applicable.

The STEM work request (LOVELACE T7N-R63W-S32 L01\_FINAL PACKET, p 3) requests the installation of a D-Grade LP separator. The job sheet (LOVELACE T7N-R63W-S32 L01\_FINAL PACKET, p 20) confirms a new LP separator was installed. A1 from the walkdown checklist (LOVELACE T7N-R63W-S32 L01\_WALKDOWN) confirms the 1/2" trim size, but there is no confirmation of the valve size. A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM T4N-R65W-S2 L01**  
 Consent Decree Tank System Number: **242**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L01_FINAL PACKET	.pdf	2/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	1/15/2018	STEM Engineering Evaluation Spreadsheet
LOWER LATHAM T4N-R65W-S2 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L01_FINAL PACKET	.pdf	2/24/2016	Work Request
LOWER LATHAM T4N-R65W-S2 L01_FINAL PACKET	.pdf	2/24/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L01_WALKDOWN	.pdf	2/24/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L01_IR VERIFICAITON	.pdf	2/22/2016	IR Verification Field Data Sheet
LOWER LATHAM T4N-R65W-S2 L01_0690_NORMAL	.mp4	2/16/2016	IR Camera Video Normal Operations
LOWER LATHAM T4N-R65W-S2 L01_0691_DUMP	.mp4	2/16/2016	IR Camera Video During Dump Event
LOWER LATHAM T4N-R65W-S2 L01_0692_POST	.mp4	2/16/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** LOWER LATHAM T4N-R65W-S2 L01

**Consent Decree Tank System Number:** 242

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>70</b>	<b>400</b>	<b>70</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>				

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED 48" Gen 1 #7</b>	<b>COMM 200 48"</b>	
Number of Units	<b>1</b>	<b>2</b>	<b>1</b>	
Man. Capacity (MSCFD)	<b>110.4</b>	<b>140</b>	<b>157</b>	

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>23,346</b>	<b>23,349</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>9,828</b>	<b>22,808</b>	
Headspace Surge Capacity (scfh)	<b>51,827</b>	<b>51,827</b>	
Total VCS Capacity (scfh)	<b>61,655</b>	<b>74,635</b>	
VCS Capacity minus PPIVF (scfh)	<b>38,309</b>	<b>51,286</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 12/13/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM T4N-R65W-S2 L01**

Consent Decree Tank System Number: **242**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.80	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	1437	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	162.1	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	14	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.80	0.80	0.80	0.80				
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20	12.20	12.20	12.20				
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200				
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bwpd) <sup>f,g</sup>	6789	3023	6789	3023				

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	27	12	27	12				
Working Flow (Mscfd) <sup>l</sup>	38	17	38	17				

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	29	6

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	10,638	10,638
Oil Tank Working Rate	897	895
Water Tank Flash Rate	3,271	3,270
Water Tank Working Rate	4,591	4,590
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	2,527	2,527
Total	23,349	23,346

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM T4N-R65W-S2 L01**

Consent Decree Tank System Number: **242**

### Audit Notes

Installation of two additional VOC combustors: The Work Request Form calls for the use of five total combustors, including the installation of two additional VOC combustors, on this site. The provided documents did not confirm the installation of the two additional VOC combustors. Google Earth photos show that the appropriate number of combustors (five) are on location. The Signed Evaluation lists the appropriate number of VOC combustors for the tanks. INFO. REQUEST - Confirm that the VCS is connected to four combustors (two -Leed 48 Gen 1 #7, one - 48" Tornado and one COMM 200 48"). Noble responded to data request as follows "1) Field verification completed on or around 1/12/18 confirmed there are two leed 48", one 48" Tornado and one Comm 48" combustor."

Dump valve modifications: The Work Request form prescribes several dump valve trims being changed. Other than Items A1 and A2 on the Walkdown Checklist, there are no other documents confirming the G11-69HN oil dump valve trim being reduced to 3/4", or the G12-69HN oil dump valve trim being reduced to 1/2" or the G11-69HN water dump valves being reduced to 3/4". The Signed Evaluation lists the appropriate trim size for each dump valve as prescribed in the Work Request Form. Walkdown Checklist, Items A1 and A2 will be used as confirmation that the dump valve trims were reduced as specified in the field documents and signed evaluation.

- VCS Line Sizes: A line size change for the VOC line from the KO to the burner is not listed in the Work Request Form. The Final Packet, page 16 identifies the size of the VOC line from the KO to burner as 3" for both production trains. The Signed Evaluation considers the VOC line from the KO to the burner as 4". In the documentation, there is no confirmation that the line size was changed from 3" to 4". Noble responded to data request as follows "e VOC line from the KO to Burners is confirmed to be 4" diameter as requested in the work scope. Confirmation was by field verification completed on or around 2/16/16."

- VCS Line Configuration: Item 3 in the Tanks section of the Work Request Form asks that the two 3" AGL VOC headers from the tanks to burners be "tee'ed together". Google Earth photos seem to indicate that the two separate VOC header were replaced with a single VOC header across the top of the tanks, to the KO and out to the combustors. The TLO document will be used as confirmation that the tank VOC line controls all of the 300 bbl tanks. The Signed Evaluation considers a single VOC header system controlling five (5) oil tanks and one (1) produced water tank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM T4N-R65W-S2 L02**

Consent Decree Tank System Number: **239**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L02_FINAL PACKET	.pdf	11/11/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L02_STEM Engineering Evaluation_rev1	.xlsm	11/11/2016	STEM Engineering Evaluation Spreadsheet
LOWER LATHAM T4N-R65W-S2 L02_SIGNED EVAL	.pdf	11/15/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L02_FINAL PACKET	.pdf	11/11/2016	Work Request
LOWER LATHAM T4N-R65W-S2 L02_FINAL PACKET	.pdf	11/11/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L02_WALKDOWN	.pdf	11/8/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L02_IR VERIFICATION	.pdf	11/2/2016	IR Verification Field Data Sheet
LOWER LATHAM T4N-R65W-S2 L02_1032_NORMAL	.mp4	11/1/2016	IR Camera Video Normal Operations
LOWER LATHAM T4N-R65W-S2 L02_1033_DUMP	.mp4	11/1/20116	IR Camera Video During Dump Event
LOWER LATHAM T4N-R65W-S2 L02_1034_POST	.mp4	11/1/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LOWER LATHAM T4N-R65W-S2 L02_SIGNED EVAL.	.pdf	11/15/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** LOWER LATHAM T4N-R65W-S2 L02

**Consent Decree Tank System Number:** 239

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>8,960</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>3,827</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>22,379</b>	<b>22,379</b>	
Total VCS Capacity (scfh)	<b>26,206</b>	<b>26,932</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,427</b>	<b>17,972</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/18/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/6/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM T4N-R65W-S2 L02**

Consent Decree Tank System Number: **239**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>l</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,605	7,440
Oil Tank Working Rate	641	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	8,960	8,779

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM T4N-R65W-S2 L02**

Consent Decree Tank System Number: **239**

**Audit Notes**

The Walkdown checklist (LOWER LATHAM T4N-R65W-S2 L02\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (LOWER LATHAM T4N-R65W-S2 L02\_FINAL PACKET).

The STEM work request (LOWER LATHAM T4N-R65W-S2 L02\_FINAL PACKET, p 3) requests Sep #2 and Sep #3 be combined to be a HLP separator. As per the field datasheet (LOWER LATHAM T4N-R65W-S2 L02\_FINAL PACKET) Sep #2 and Sep#3 have a 2" valve and a 1" trim. The STEM work request instruct the operator to replace the 2" 212 SWA with a 1400 with a 1/2" trim. The Job sheet (LOWER LATHAM T4N-R65W-S2 L02\_FINAL PACKET, p 23) confirms sep #1's were replaced with a 1400. A1 from the walkdown checklist (LOWER LATHAM T4N-R65W-S2 L02\_WALKDOWN,p 1) confirms the 1/2" trim was also installed. There was no documentation of updating Sep#3 to a 1" valve. A1 from the walkdown checklist confirms a 1/2" trim was installed on sep #3. Therefore, a 2" valve was used in the model to be conservative.

The field data sheet (LOWER LATHAM T4N-R65W-S2 L02\_FINAL PACKET, p 16) lists the VCS as 2". The STEM work request (LOWER LATHAM T4N-R65W-S2 L02\_FINAL PACKET, p 3) states the VSC line be updated to 4". The job description (LOWER LATHAM T4N-R65W-S2 L02\_FINAL PACKET, p 23) confirms the AGL was updated, but is not specific to the size. It is assumed that the line was updated from 2" to 4" as requested in the STEM work order.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM WEEZER T4N-R65W-S3 L01**

Consent Decree Tank System Number: **240**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LOWER LATHAM WEEZER T4N-R65W-S3 L01_FINAL PACKET	.pdf	8/22/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM WEEZER T4N-R65W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	7/12/2017	STEM Engineering Evaluation Spreadsheet
LOWER LATHAM WEEZER T4N-R65W-S3 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM WEEZER T4N-R65W-S3 L01_FINAL PACKET	.pdf	8/22/2016	Work Request
LOWER LATHAM WEEZER T4N-R65W-S3 L01_FINAL PACKET	.pdf	8/22/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM WEEZER T4N-R65W-S3 L01_WALKDOWN	.pdf	8/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM WEEZER T4N-R65W-S3 L01_IR VERIFICATION	.pdf	8/16/2016	IR Verification Field Data Sheet
LOWER LATHAM WEEZER T4N-R65W-S3 L01_1393_NORMAL	.mp4	8/15/2016	IR Camera Video Normal Operations
LOWER LATHAM WEEZER T4N-R65W-S3 L01_1394_DUMP	.mp4	8/15/2016	IR Camera Video During Dump Event
LOWER LATHAM WEEZER T4N-R65W-S3 L01_1395_POST	.mp4	8/15/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LOWER LATHAM WEEZER T4N-R65W-S3 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** LOWER LATHAM WEEZER T4N-R65W-S3 L01

**Consent Decree Tank System Number:** 240

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>25,971</b>	<b>25,977</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,963</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>133,605</b>	<b>133,605</b>	
Total VCS Capacity (scfh)	<b>136,568</b>	<b>138,205</b>	
VCS Capacity minus PPIVF (scfh)	<b>110,597</b>	<b>112,228</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 11/14/2017  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/3/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM WEEZER T4N-R65W-S3 L01**

Consent Decree Tank System Number: **240**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77	0.77						
Valve Coefficient (gpm/psi) (C)	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2409	2409						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7						
Working Flow (Mscfd) <sup>h,i</sup>	23	23						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	34	0

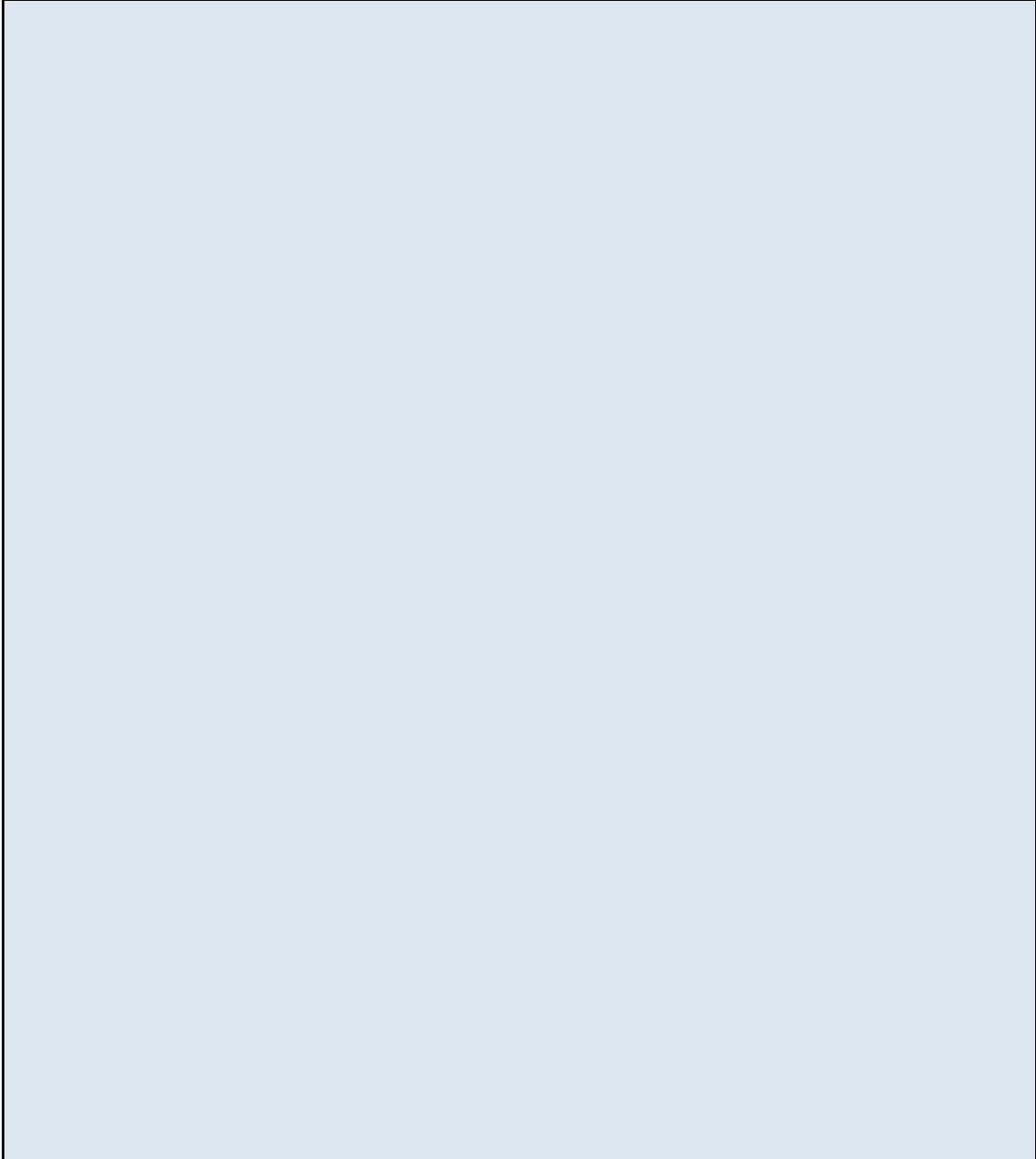
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	22,641	22,641
Oil Tank Working Rate	1,909	1,904
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	0	0
Total	25,977	25,971

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LOWER LATHAM WEEZER T4N-R65W-S3 L01**

Consent Decree Tank System Number: **240**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LUCCI T5N-R64W-S1 L01**

**Consent Decree Tank System Number:** **296**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_FINAL PACKET	.pdf	4/3/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_STEM Engineering Evaluation_rev1	.xlsm	4/29/2016	STEM Engineering Evaluation Spreadsheet
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_FINAL PACKET	.pdf	4/3/2018	Work Request
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_FINAL PACKET	.pdf	4/3/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_WALKDOWN	.pdf	4/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_IR VERIFICATION	.pdf	4/27/2016	IR Verification Field Data Sheet
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_0906_NORMAL	.mp4	4/25/2016	IR Camera Video Normal Operations
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_0907_DUMP	.mp4	4/25/2016	IR Camera Video During Dump Event
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_0908_POST	.mp4	4/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L01**

Consent Decree Tank System Number: **296**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>	<b>55</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>6,612</b>	<b>6,865</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,109</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>12,508</b>	<b>12,508</b>	
Total VCS Capacity (scfh)	<b>16,617</b>	<b>17,108</b>	
VCS Capacity minus PPIVF (scfh)	<b>10,005</b>	<b>10,243</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/28/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/30/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L01**

Consent Decree Tank System Number: **296**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.51	0.51						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.62	0.62						
Gas/Oil Ratio (scf/bbl)	88.4	88.4						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	526	526						
Vapor Pressure (psia) <sup>c</sup>	68	68						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	725	725						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	64.1	64.1						
Working Flow (Mscfd) <sup>h,i</sup>	7	7						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	23	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	5,340	5,113
Oil Tank Working Rate	574	548
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
Total	6,865	6,612

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L01**

Consent Decree Tank System Number: **296**

**Audit Notes**

The walkdown checklist (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_WALKDOWN) was not marked as being complete. Completion was verified through other documents in the final packet (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_FINAL PACKET) .

The STEM work request (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_FINAL PACKET, p 4) requests the VOC from the tanks to the KO burner be upgraded from 2" to 3". The job sheet (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_FINAL PACKET, p 22) does not confirm updating the diameter. The data request response received 11/14/2018 Noble states "Field verification for this facility was completed on or around 3/11/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed."

As per the STEM work request (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_FINAL PACKET, p 4) and job sheet (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_FINAL PACKET, p 22) separator #3 was routed to Separator #2. Separators #1 & #2 both are listed as having 2" 212 SMA valves. The Job sheet (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_FINAL PACKET, p 22) does not confirm updating the valves to 1" as requested in the work request (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_FINAL PACKET, p 4). The walkdown checklist (LUCCI T5N-R64W-S1 L01 & LUCCI T5N-R64W-S1 L06\_WALKDOWN,p 1) A1 confirms that the trim was replaced with a 1/2" trim. The valve was run at 2" in the model to be conservative. It is unknown whether the Modeling Guidance was correctly applied since it is unconfirmed if the valves were changed.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L03**

Consent Decree Tank System Number: **289**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L03_FINAL PACKET	.pdf	4/3/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L03_STEM Engineering Evaluation_rev1	.xlsm	5/4/2016	STEM Engineering Evaluation Spreadsheet
LUCCI T5N-R64W-S1 L03_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L03_FINAL PACKET	.pdf	4/3/2018	Work Request
LUCCI T5N-R64W-S1 L03_FINAL PACKET	.pdf	4/3/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L03_WALKDOWN	.pdf	4/25/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L03_IR VERIFICATION	.pdf		IR Verification Field Data Sheet
LUCCI T5N-R64W-S1 L03_0876_Normal	.mp4	4/18/2016	IR Camera Video Normal Operations
LUCCI T5N-R64W-S1 L03_0877_Dump	.mp4	4/18/2016	IR Camera Video During Dump Event
LUCCI T5N-R64W-S1 L03_0878_Post	.mp4	4/18/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L03_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L03**

Consent Decree Tank System Number: **289**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,216</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>6,169</b>	<b>6,169</b>	
Total VCS Capacity (scfh)	<b>9,385</b>	<b>10,769</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,401</b>	<b>5,784</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/4/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/7/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L03**

Consent Decree Tank System Number: **289**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>23</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L03**

Consent Decree Tank System Number: **289**

**Audit Notes**

The walkdown checklist (LUCCI T5N-R64W-S1 L03\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (LUCCI T5N-R64W-S1 L03\_FINAL PACKET).

A1 from the walkdown checklist (LUCCI T5N-R64W-S1 L03\_WALKDOWN) was used to determine the trim size for the HLP separator. The field datasheet (LUCCI T5N-R64W-S1 L03\_FINAL PACKET, p 14) was used to confirm the 1" valve size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L04**

Consent Decree Tank System Number: **297**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L04_FINAL PACKET	.pdf	1/4/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L04_STEM Engineering Evaluation_rev1	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
LUCCI T5N-R64W-S1 L04_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L04_FINAL PACKET	.pdf	1/4/2016	Work Request
LUCCI T5N-R64W-S1 L04_FINAL PACKET	.pdf	1/4/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L04_WALKDOWN	.pdf	1/4/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L04_IR VERIFICATION	.pdf	12/31/2015	IR Verification Field Data Sheet
LUCCI T5N-R64W-S1 L04_0070_NORMAL	.mp4	12/29/2015	IR Camera Video Normal Operations
LUCCI T5N-R64W-S1 L04_0071_DUMP	.mp4	12/29/2015	IR Camera Video During Dump Event
LUCCI T5N-R64W-S1 L04_0072_POST	.mp4	12/29/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L04_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LUCCI T5N-R64W-S1 L04**

**Consent Decree Tank System Number:** **297**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,244</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,363</b>	<b>2,363</b>	
Total VCS Capacity (scfh)	<b>5,915</b>	<b>6,963</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,833</b>	<b>2,719</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/4/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L04**

Consent Decree Tank System Number: **297**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,454</b>	<b>3,307</b>
Oil Tank Working Rate	<b>314</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,244</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L04**

Consent Decree Tank System Number: **297**

**Audit Notes**

The Work Request indicated the oil dump valve on the separator was to be modified to a Kimray with 1/2 inch trim. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. The signed evaluation used a 1" valve size. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L05**

Consent Decree Tank System Number: **291**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L05_FINAL PACKET	.pdf	1/5/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L05_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
LUCCI T5N-R64W-S1 L05_SIGNED EVAL	.pdf	12/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L05_FINAL PACKET	.pdf	1/5/2016	Work Request
LUCCI T5N-R64W-S1 L05_FINAL PACKET	.pdf	1/5/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L05_WALKDOWN	.pdf	1/4/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L05_IR VERIFICATION	.pdf	1/4/2016	IR Verification Field Data Sheet
LUCCI T5N-R64W-S1 L05_0558_NORMAL	.mp4	1/4/2016	IR Camera Video Normal Operations
LUCCI T5N-R64W-S1 L05_0559_DUMP	.mp4	1/4/2016	IR Camera Video During Dump Event
LUCCI T5N-R64W-S1 L05_0560_POST	.mp4	1/4/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LUCCI T5N-R64W-S1 L05_SIGNED EVAL	.pdf	12/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** LUCCI T5N-R64W-S1 L05

**Consent Decree Tank System Number:** 291

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>22,955</b>	<b>4,203</b>	
Total VCS Capacity (scfh)	<b>26,326</b>	<b>8,803</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,580</b>	<b>4,056</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L05**

Consent Decree Tank System Number: **291**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUCCI T5N-R64W-S1 L05**

Consent Decree Tank System Number: **291**

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm a tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

Noble provided additional information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 12/17/2015, field verification confirmed that one tank was converted to a headspace tank." The Engineering Design Standard has been appropriately applied based on the provided field verification information.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUNDVALL STEVE T5N-R66W-S30 L01**

Consent Decree Tank System Number: **1313**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
LUNDVALL STEVE T5N-R66W-S30 L01_FINAL PACKET	.pdf	1/31/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
LUNDVALL STEVE T5N-R66W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	1/31/2017	STEM Engineering Evaluation Spreadsheet
LUNDVALL STEVE T5N-R66W-S30 L01_SIGNED EVAL	.pdf	2/14/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
LUNDVALL STEVE T5N-R66W-S30 L01_FINAL PACKET	.pdf	1/31/2017	Work Request
LUNDVALL STEVE T5N-R66W-S30 L01_FINAL PACKET	.pdf	2/1/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
LUNDVALL STEVE T5N-R66W-S30 L01_WALKDOWN	.pdf	1/31/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
LUNDVALL STEVE T5N-R66W-S30 L01_IR VERIFICATION	.pdf	1/31/2017	IR Verification Field Data Sheet
LUNDVALL STEVE T5N-R66W-S30 L01_0096_NORMAL	.mp4	1/27/2017	IR Camera Video Normal Operations
LUNDVALL STEVE T5N-R66W-S30 L01_0097_DUMP	.mp4	1/28/2017	IR Camera Video During Dump Event
LUNDVALL STEVE T5N-R66W-S30 L01_0098_POST	.mp4	1/29/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
LUNDVALL STEVE T5N-R66W-S30 L01_SIGNED EVAL	.pdf	2/14/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **LUNDVALL STEVE T5N-R66W-S30 L01**

**Consent Decree Tank System Number:** **1313**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>266</b>	<b>266</b>	
Total VCS Capacity (scfh)	<b>3,932</b>	<b>5,224</b>	
VCS Capacity minus PPIVF (scfh)	<b>864</b>	<b>2,030</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 11/16/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 4/20/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUNDVALL STEVE T5N-R66W-S30 L01**

Consent Decree Tank System Number: **1313**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUNDVALL STEVE T5N-R66W-S30 L01**

Consent Decree Tank System Number: **1313**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 12-17) are not dated. Assumed the date is the same as Facility Scouting date (7/25/2016).

**2. Oil dump valve size not verified**

The work request form (Final Packet, pg 4) indicates the existing 2" 212 dump valves on the separator were to be replaced with 1" 1400 valves with 1/2" trim.

Item A1 of the walkdown checklist (Final Packet, pg 28) is marked "yes" verifying the correct trim size was installed. No indication of the dump valve size was observed.

Assuming the 2" dump valve was not replaced results in a slightly larger PPIVFR than calculated by the engineering evaluation. However, this does not result in an exceedence of the VCS capacity.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUNDVALL T5N-R66W-S20 L01**

Consent Decree Tank System Number: **2116**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
LUNDVALL T5N-R66W-S20 L01_FINAL PACKET	.pdf	10/27/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
LUNDVALL T5N-R66W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	3/6/2017	STEM Engineering Evaluation Spreadsheet
LUNDVALL T5N-R66W-S20 L01_SIGNED EVAL	.pdf	3/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
LUNDVALL T5N-R66W-S20 L01_FINAL PACKET	.pdf	10/27/2017	Work Request
LUNDVALL T5N-R66W-S20 L01_FINAL PACKET	.pdf	10/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
LUNDVALL T5N-R66W-S20 L01_WALKDOWN	.pdf	2/24/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
LUNDVALL T5N-R66W-S20 L01_IR VERIFICATION	.pdf	2/24/2017	IR Verification Field Data Sheet
LUNDVALL T5N-R66W-S20 L01_0127_NORMAL	.mp4	2/24/2017	IR Camera Video Normal Operations
LUNDVALL T5N-R66W-S20 L01_0128_DUMP	.mp4	2/24/2017	IR Camera Video During Dump Event
LUNDVALL T5N-R66W-S20 L01_0129_POST	.mp4	2/24/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
LUNDVALL T5N-R66W-S20 L01_SIGNED EVAL	.pdf	3/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUNDVALL T5N-R66W-S20 L01**

Consent Decree Tank System Number: **2116**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,954</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>550</b>	<b>656</b>	
Total VCS Capacity (scfh)	<b>4,504</b>	<b>5,614</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,060</b>	<b>2,027</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 12/19/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 2/6/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUNDVALL T5N-R66W-S20 L01**

Consent Decree Tank System Number: **2116**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **LUNDVALL T5N-R66W-S20 L01**

Consent Decree Tank System Number: **2116**

**Audit Notes**

**1. Oil dump valve size unknown**

The STEM Work Request (Final Packet, pg 3) requests a new HLP separator be installed onsite as well as the oil dump valve trim size on that separator to be 1/2". The Job Sheet (Final Packet, pg 20) indicates a new HLP separator was installed onsite however the Job Sheet does indicate the valve size or valve trim size. Item A1 in the STEM Walkdown Checklist (Final Packet, pg 26) is checked "yes", indicating the oil dump valve trim is a 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the modeling guideline cannot be confirmed as being followed. Assuming a 2" valve size on the separator does not show an exceedance of the vapor control system capacity.

**2. Separator maximum operating pressure discrepancy**

The Job Sheet (Final Packet pg 20) indicates the separator maximum operating pressure was set to 50 psig. The STEM Work Request form (Final Packet pg 3) and QC Stem Checkout (Final Packet pg 25) indicate the separator maximum operating pressure was set to 60 psig. The Signed Evaluation used 60 psig and would overestimate the actual PPIVFR if the set point were in fact 50 psig.

**3. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 9-14) are not dated, no facility scouting date included. Date assumed to be prior to STEM Work Request Form date (11/13/2015).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MAGNUSON T5N-R65W-S21 L01**

Consent Decree Tank System Number: **224**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MAGNUSON T5N-R65W-S21 L01_FINAL PACKET	.pdf	4/13/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MAGNUSON T5N-R65W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	4/7/2017	STEM Engineering Evaluation Spreadsheet
MAGNUSON T5N-R65W-S21 L01_Final Signed STEM Plan	.pdf	5/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MAGNUSON T5N-R65W-S21 L01_FINAL PACKET	.pdf	4/13/2017	Work Request
MAGNUSON T5N-R65W-S21 L01_FINAL PACKET	.pdf	4/13/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MAGNUSON T5N-R65W-S21 L01_WALKDOWN	.pdf	4/13/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MAGNUSON T5N-R65W-S21 L01_IR VERIFICATION	.pdf	4/5/2017	IR Verification Field Data Sheet
MAGNUSON T5N-R65W-S21 L01_0815_NORMAL	.mp4	4/4/2017	IR Camera Video Normal Operations
MAGNUSON T5N-R65W-S21 L01_0816_DUMP	.mp4	4/4/2017	IR Camera Video During Dump Event
MAGNUSON T5N-R65W-S21 L01_0817_POST	.mp4	4/4/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MAGNUSON T5N-R65W-S21 L01_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MAGNUSON T5N-R65W-S21 L01**

Consent Decree Tank System Number: **224**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,571</b>	<b>2,571</b>	
Total VCS Capacity (scfh)	<b>5,297</b>	<b>8,404</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,616</b>	<b>4,722</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 11/14/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/4/2017

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MAGNUSON T5N-R65W-S21 L01**

Consent Decree Tank System Number: **224**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MAGNUSON T5N-R65W-S21 L01**

Consent Decree Tank System Number: **224**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MALO T8N-R59W-S20 L01**

Consent Decree Tank System Number: **1649**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MALO T8N-R59W-S20 L01_FINAL PACKET	.pdf	8/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MALO T8N-R59W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	8/21/2017	STEM Engineering Evaluation Spreadsheet
MALO T8N-R59W-S20 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MALO T8N-R59W-S20 L01_FINAL PACKET	.pdf	8/10/2017	Work Request
MALO T8N-R59W-S20 L01_FINAL PACKET	.pdf	8/10/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MALO T8N-R59W-S20 L01_WALKDOWN	.pdf	8/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MALO T8N-R59W-S20 L01_IR VERIFICATION	.pdf	3/22/2018	IR Verification Field Data Sheet
MALO T8N-R59W-S20 L01_2263_NORMAL	.mp4	8/9/2017	IR Camera Video Normal Operations
MALO T8N-R59W-S20 L01_2264_DUMP	.mp4	8/9/2017	IR Camera Video During Dump Event
MALO T8N-R59W-S20 L01_2265_POST	.mp4	8/9/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MALO T8N-R59W-S20 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MALO T8N-R59W-S20 L01**

**Consent Decree Tank System Number:** **1649**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>155</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 1" (ro)</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>40,354</b>	<b>39,691</b>	<b>-2%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>109,563</b>	<b>109,563</b>	
Total VCS Capacity (scfh)	<b>112,288</b>	<b>115,396</b>	
VCS Capacity minus PPIVF (scfh)	<b>71,934</b>	<b>75,705</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/15/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MALO T8N-R59W-S20 L01**

Consent Decree Tank System Number: **1649**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.60</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.71</b>							
Gas/Oil Ratio (scf/bbl)	<b>293.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>17.60</b>							
Critical Pressure (psia) <sup>b</sup>	<b>615</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>168</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3090</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>908.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>29</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	
scfh vapor/tank <sup>i</sup>	<b>317</b>	
Mscfd	<b>15</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>37,833</b>	<b>38,478</b>
Oil Tank Working Rate	<b>1,224</b>	<b>1,242</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>634</b>	<b>634</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>39,691</b>	<b>40,354</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MALO T8N-R59W-S20 L01**

Consent Decree Tank System Number: **1649**

**Audit Notes**

The walkdown checklist (MALO T8N-R59W-S20 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (MALO T8N-R59W-S20 L01\_FINAL PACKET) where applicable.

Documentation indicates that a 1" flow orifice is used in combination with a valve to restrict flow from the LP separator. NEI provided a summary of their derivation of combined flow valve-orifice flow characteristics. SLR used Cf and Cv as provided by NEI.

The separator pneumatic PSHH is set by the operator, not automation, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 155 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

There were inconsistencies in the number of tanks present on the site.

- The walkdown checklist states there are 2 oil tanks on site (8/9/2007)
- The signed Evaluation was completed with 2 oil tanks on site (8/21/2017)
- The IR video shows 2 tanks on site (8/9/2017)
- The Field datasheet from the Final packet (page 10) shows 2 oil tanks and 1 water tank. (2017)
- The Ariel photo from the Final Pack (page 18) shows 3 tanks (unknown date).

The most current data (walkdown checklist and IR camera videos) were used as confirmation of the number of tanks on site.

There were also inconsistencies about whether or not one of the tanks was converted into a headspace tank. The Work Request specified that a tank was to be bottomed out and used as headspace. There is no confirmation that this was completed. The data request response from 12/21/2018 Noble stated "Field verification for this facility was completed on or around 5/23/2017, field verification confirmed that one tank was converted to a headspace tank."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MANSFIELD T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1962**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MANSFIELD T6N-R65W-S36 L01_FINAL PACKET	.pdf	1/26/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MANSFIELD T6N-R65W-S36 L01_STEM Engineering Evaluation_rev 1	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
MANSFIELD T6N-R65W-S36 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MANSFIELD T6N-R65W-S36 L01_FINAL PACKET	.pdf	1/26/2018	Work Request
MANSFIELD T6N-R65W-S36 L01_FINAL PACKET	.pdf	1/26/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MANSFIELD T6N-R65W-S36 L01_FINAL PACKET	.pdf	1/26/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MANSFIELD T6N-R65W-S36 L01_IR VERIFICATION	.pdf	8/7/2015	IR Verification Field Data Sheet
MANSFIELD T6N-R65W-S36 L01_0212_NORMAL	.mp4	8/6/2015	IR Camera Video Normal Operations
MANSFIELD T6N-R65W-S36 L01_0213_DUMP	.mp4	8/6/2015	IR Camera Video During Dump Event
MANSFIELD T6N-R65W-S36 L01_0214_POST	.mp4	8/6/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MANSFIELD T6N-R65W-S36 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MANSFIELD T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1962**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>500</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>20,575</b>	<b>20,577</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,740</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>29,848</b>	<b>29,848</b>	
Total VCS Capacity (scfh)	<b>33,588</b>	<b>34,401</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,013</b>	<b>13,824</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 5/9/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MANSFIELD T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1962**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	5068	12689						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	20	51						
Working Flow (Mscfd) <sup>l</sup>	28	71						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	23	6

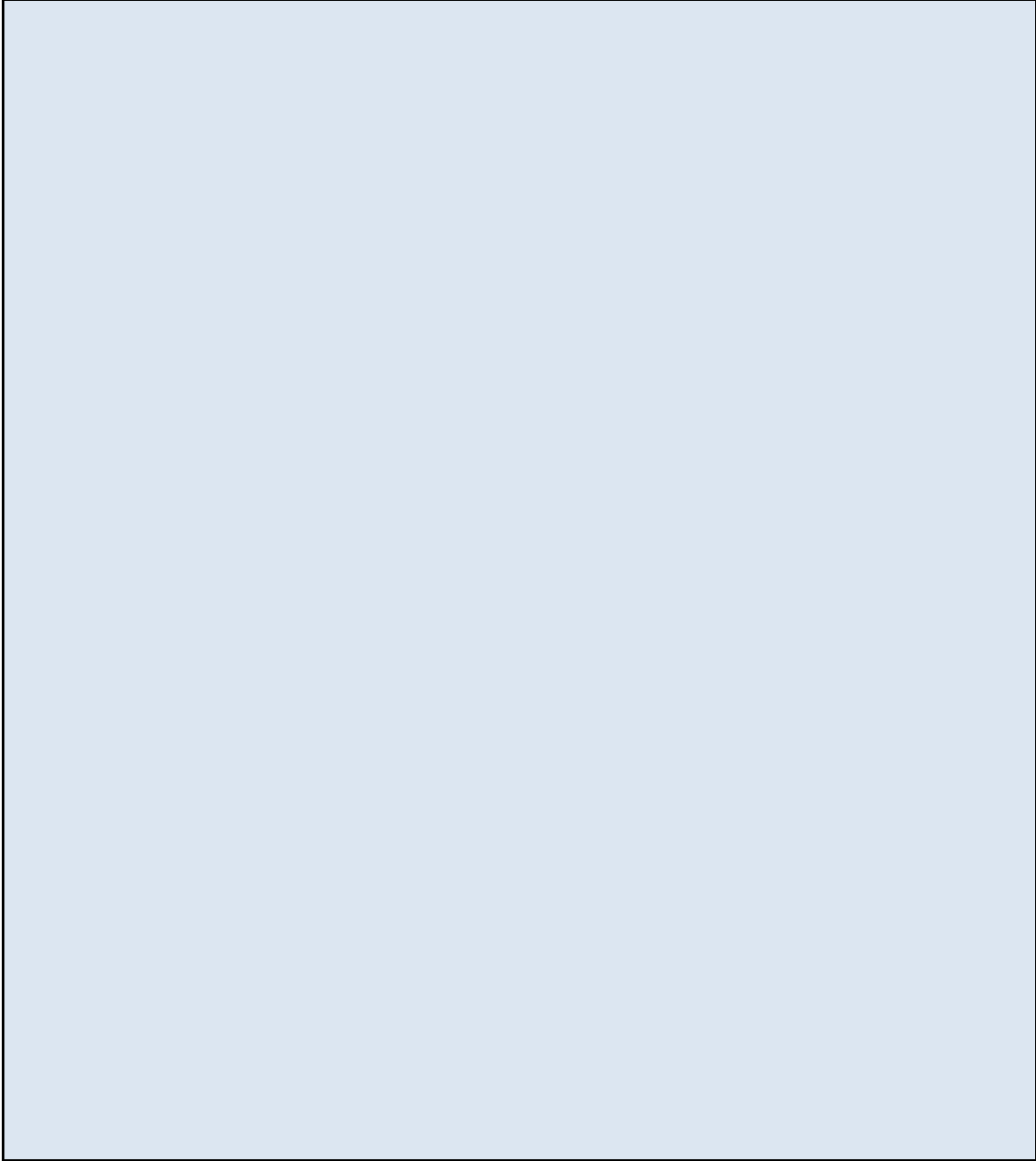
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	2,959	2,959
Water Tank Working Rate	4,154	4,154
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
Total	20,577	20,575

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MANSFIELD T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1962**

**Audit Notes**





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARIE GITTLEIN T3N-R64W-S4 L01**

Consent Decree Tank System Number: **517**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MARIE GITTLEIN T3N-R64W-S4 L01_FINAL PACKET	.pdf	2/16/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MARIE GITTLEIN T3N-R64W-S4 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
MARIE GITTLEIN T3N-R64W-S4 L01_SIGNED EVAL	.pdf	1/2/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MARIE GITTLEIN T3N-R64W-S4 L01_FINAL PACKET	.pdf	2/16/2017	Work Request
MARIE GITTLEIN T3N-R64W-S4 L01_FINAL PACKET	.pdf	2/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MARIE GITTLEIN T3N-R64W-S4 L01_WALKDOWN	.pdf	11/29/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MARIE GITTLEIN T3N-R64W-S4 L01_IR VERIFICATION	.pdf	11/29/2017	IR Verification Field Data Sheet
MARIE GITTLEIN T3N-R64W-S4 L01_2222_NORMAL	.mp4	11/29/2017	IR Camera Video Normal Operations
MARIE GITTLEIN T3N-R64W-S4 L01_2223_DUMP	.mp4	11/29/2017	IR Camera Video During Dump Event
MARIE GITTLEIN T3N-R64W-S4 L01_2224_POST	.mp4	11/29/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MARIE GITTLEIN T3N-R64W-S4 L01_SIGNED EVAL	.pdf	1/2/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** MARIE GITTLEIN T3N-R64W-S4 L01

**Consent Decree Tank System Number:** 517

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,945</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>18,288</b>	<b>18,288</b>	
Total VCS Capacity (scfh)	<b>21,233</b>	<b>24,121</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,487</b>	<b>19,374</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/6/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARIE GITTLEIN T3N-R64W-S4 L01**

Consent Decree Tank System Number: **517**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

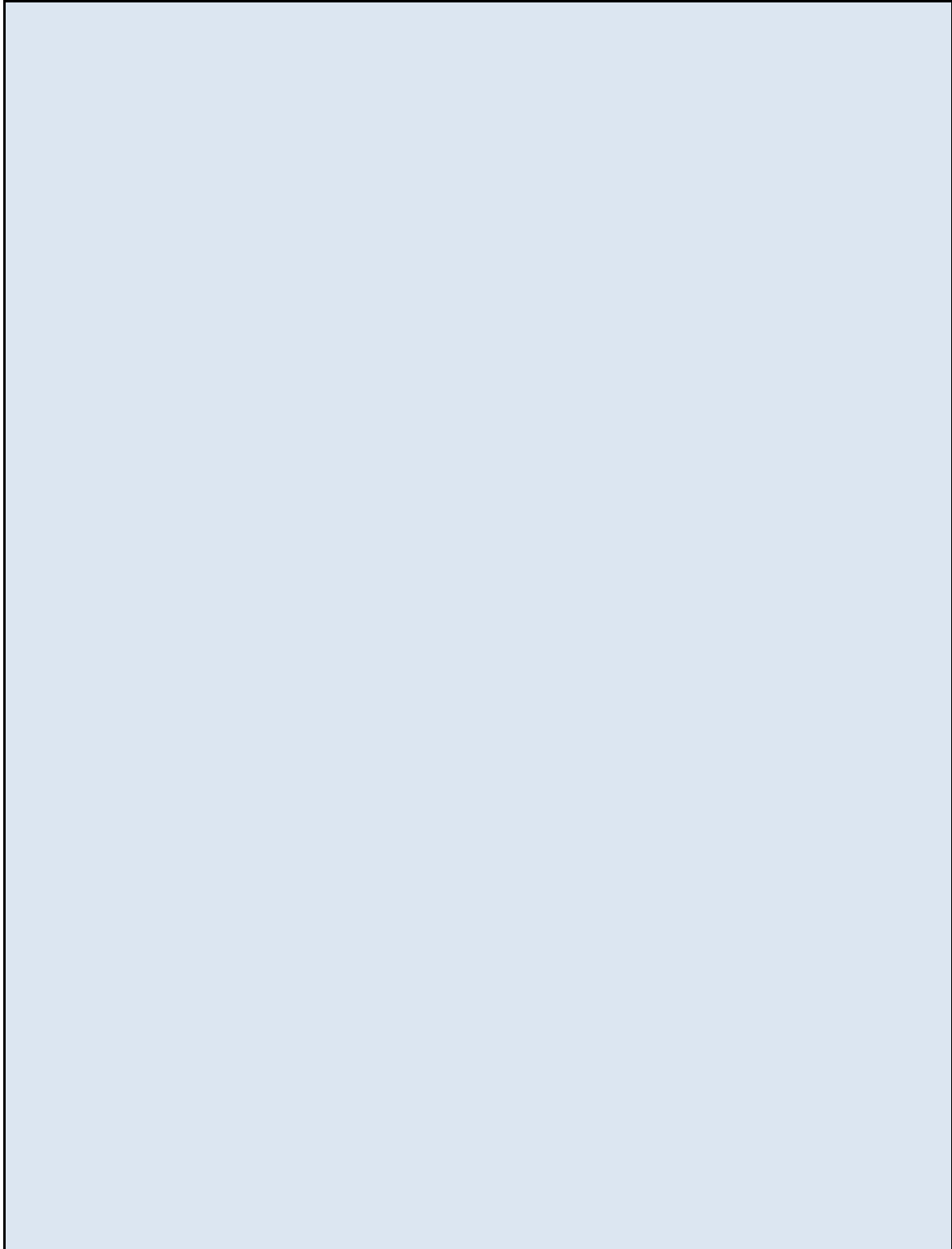
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARIE GITTLEIN T3N-R64W-S4 L01**

Consent Decree Tank System Number: **517**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARIE T3N-R64W-S4 L01**

Consent Decree Tank System Number: **1143**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MARIE T3N-R64W-S4 L01_FINAL PACKET	.pdf	10/16/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MARIE T3N-R64W-S4 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
MARIE T3N-R64W-S4 L01_SIGNED EVAL	.pdf	10/26/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MARIE T3N-R64W-S4 L01_FINAL PACKET	.pdf	10/16/2017	Work Request
MARIE T3N-R64W-S4 L01_FINAL PACKET	.pdf	10/16/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
MARIE T3N-R64W-S4 L01_WALKDOWN	.pdf	10/13/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MARIE T3N-R64W-S4 L01_IR VERIFICATION	.pdf	10/13/2017	IR Verification Field Data Sheet
MARIE T3N-R64W-S4 L01_0013_NORMAL	.mp4	10/13/2017	IR Camera Video Normal Operations
MARIE T3N-R64W-S4 L01_0015_DUMP	.mp4	10/13/2017	IR Camera Video During Dump Event
MARIE T3N-R64W-S4 L01_0016_POST	.mp4	10/13/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MARIE T3N-R64W-S4 L01_SIGNED EVAL	.pdf	10/26/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MARIE T3N-R64W-S4 L01**  
**Consent Decree Tank System Number:** **1143**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>160</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,084</b>	<b>3,211</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>314</b>	<b>390</b>	
Total VCS Capacity (scfh)	<b>4,312</b>	<b>5,348</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,228</b>	<b>2,138</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARIE T3N-R64W-S4 L01**  
Consent Decree Tank System Number: **1143**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>160</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>127</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>254</b>	<b>254</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,211</b>	<b>3,084</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARIE T3N-R64W-S4 L01**

Consent Decree Tank System Number: **1143**

**Audit Notes**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The STEM Work Request indicates the 2" VOC line on the top of the oil storage tanks to the KO pot was to be replaced with a 3" line. There is no confirmation that the piping modification occurred. The Engineering Evaluation was completed with a 3" NPS for this section of pipe.

Noble provided information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 8/15/2017, field verification confirmed that the 3" VOC line from the tank to the KO was installed." The Engineering Design Standard was appropriately applied based on the provided field verification information.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARK ST T4N-R65W-S36 L01**

Consent Decree Tank System Number: **2017**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MARK ST T4N-R65W-S36 L01_FINAL PACKET	.pdf	4/4/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MARK ST T4N-R65W-S36 L01_STEM Engineering Evaluation_rev1_with TLO_Oil	.xlsm	6/26/2017	STEM Engineering Evaluation Spreadsheet
MARK ST T4N-R65W-S36 L01_SIGNED EVAL_OIL	.pdf	7/17/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MARK ST T4N-R65W-S36 L01_FINAL PACKET	.pdf	4/4/2018	Work Request
MARK ST T4N-R65W-S36 L01_FINAL PACKET	.pdf	4/4/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MARK ST T4N-R65W-S36 L01_WALKDOWN	.pdf	4/25/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MARK ST T4N-R65W-S36 L01_IR VERIFICATION	.pdf	4/25/2016	IR Verification Field Data Sheet
MARK ST T4N-R65W-S36 L01_0896_Normal	.mp4	4/21/2016	IR Camera Video Normal Operations
MARK ST T4N-R65W-S36 L01_0897_Dump	.mp4	4/21/2016	IR Camera Video During Dump Event
MARK ST T4N-R65W-S36 L01_0898_Post	.mp4	4/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MARK ST T4N-R65W-S36 L01_SIGNED EVAL_OIL	.pdf	7/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARK ST T4N-R65W-S36 L01**

Consent Decree Tank System Number: **2017**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,787</b>	<b>9,789</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>41,319</b>	<b>41,319</b>	
Total VCS Capacity (scfh)	<b>45,082</b>	<b>45,872</b>	
VCS Capacity minus PPIVF (scfh)	<b>35,295</b>	<b>36,083</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/2/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/10/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARK ST T4N-R65W-S36 L01**

Consent Decree Tank System Number: **2017**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.80</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1379</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>144.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>13</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,002</b>	<b>6,002</b>
Oil Tank Working Rate	<b>546</b>	<b>545</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>9,789</b>	<b>9,787</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARK ST T4N-R65W-S36 L01**

Consent Decree Tank System Number: **2017**

**Audit Notes**

This site was selected to be re-filmed because the name of the site was never shown in any of the 3 videos.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARLEY T4N-R64W-S1 L01**

Consent Decree Tank System Number: **1956**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MARLEY T4N-R64W-S1 L01_FINAL PACKET	.pdf	2/12/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MARLEY T4N-R64W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	10/12/2016	STEM Engineering Evaluation Spreadsheet
MARLEY T4N-R64W-S1 L01_Final Signed STEM Plan	.pdf	1/3/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MARLEY T4N-R64W-S1 L01_FINAL PACKET	.pdf	2/12/2018	Work Request
MARLEY T4N-R64W-S1 L01_FINAL PACKET	.pdf	2/12/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MARLEY T4N-R64W-S1 L01_WALKDOWN	.pdf	10/10/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MARLEY T4N-R64W-S1 L01_IR VERIFICATION	.pdf	10/5/2016	IR Verification Field Data Sheet
MARLEY T4N-R64W-S1 L01_1563_NORMAL	.mp4	10/3/2016	IR Camera Video Normal Operations
MARLEY T4N-R64W-S1 L01_1564_DUMP	.mp4	10/3/2016	IR Camera Video During Dump Event
MARLEY T4N-R64W-S1 L01_1565_POST	.mp4	10/3/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MARLEY T4N-R64W-S1 L01_SIGNED EVAL	.pdf	10/17/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MARLEY T4N-R64W-S1 L01**

**Consent Decree Tank System Number:** **1956**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>20,425</b>	<b>20,425</b>	
Total VCS Capacity (scfh)	<b>24,514</b>	<b>25,025</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,006</b>	<b>20,516</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 2/27/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARLEY T4N-R64W-S1 L01**

Consent Decree Tank System Number: **1956**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARLEY T4N-R64W-S1 L01**

Consent Decree Tank System Number: **1956**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

CB - No additional information is needed for this verification.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01**

Consent Decree Tank System Number: **365**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_FINAL PACKET	.pdf	5/20/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_STEM Engineering Eval_rev1	.xlsm	5/20/2016	STEM Engineering Evaluation Spreadsheet
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_SIGNED EVAL	.pdf	5/20/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_FINAL PACKET	.pdf	5/20/2016	Work Request
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_FINAL PACKET	.pdf	5/20/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_WALKDOWN	.pdf	5/18/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_IR VERIFICATION	.pdf	5/18/2016	IR Verification Field Data Sheet
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_1054_NORMAL	.mp4	5/18/2016	IR Camera Video Normal Operations
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_1055_DUMP	.mp4	5/18/2016	IR Camera Video During Dump Event
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_1056_POST	.mp4	5/18/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01_SIGNED EVAL	.pdf	5/20/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01**

**Consent Decree Tank System Number:** **365**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,926</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,945</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>4,803</b>	<b>5,043</b>	
Total VCS Capacity (scfh)	<b>7,748</b>	<b>10,876</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,002</b>	<b>5,950</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 12/19/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 2/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01**

Consent Decree Tank System Number: **365**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARSHALL MEL SMOOKLER RURAL LAND T4N-R65W-S32 L01**

Consent Decree Tank System Number: **365**

**Audit Notes**

**1. HLP Separator Serial Number Discrepancy**

The Installed Equipment Sheets (Final Packet, pg 24) indicates the HLP separator which remains onsite and was repurposed to be the only separator onsite which dumps to the oil tanks has a Serial Number of 30161. The QC STEM Checkout (Final Packet, pg 21) indicates the separator which dumps to the tanks onsite has a Serial Number of 30163. SLR assumes the Serial Number on the QC STEM Checkout to be a mistake and should instead read 30161.

**2. Oil dump valve size unknown**

The Field Datasheet (Final Packet, pg 14) indicates that the existing HLP separator which remains onsite originally had a 2" oil dump valve. The Work Request (Final Packet, pg 3) specifies that the 2" valve be replaced with a 1" valve but no documentation was provided confirming this work was completed. A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, ½", a 2" valve could be installed and therefore the modeling guideline cannot be confirmed as being followed. Assuming a 2" valve size on the separator does not show an exceedance of the vapor control system capacity. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**3. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 11-16) are not dated, no facility scouting date included. Date assumed to be prior to STEM Work Request Form date (2/26/2016).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARTINEZ T4N-R67W-S27 L01**

Consent Decree Tank System Number: **2028**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MARTINEZ T4N-R67W-S27 L01_FINAL PACKET	.pdf	8/27/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MARTINEZ T4N-R67W-S27 L01_STEM Engineering Evaluation_rev1	.xlsm	5/10/2018	STEM Engineering Evaluation Spreadsheet
MARTINEZ T4N-R67W-S27 L01_SIGNED EVAL	.pdf	5/16/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MARTINEZ T4N-R67W-S27 L01_FINAL PACKET	.pdf	2/1/2018	Work Request
MARTINEZ T4N-R67W-S27 L01_FINAL PACKET	.pdf	4/13/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
MARTINEZ T4N-R67W-S27 L01_WALKDOWN	.pdf	5/9/2018	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MARTINEZ T4N-R67W-S27 L01_IR VERIFICATION	.pdf	5/9/2018	IR Verification Field Data Sheet
MARTINEZ T4N-R67W-S27 L01_0184_NORMAL	.mp4	5/9/2018	IR Camera Video Normal Operations
MARTINEZ T4N-R67W-S27 L01_0185_DUMP	.mp4	5/9/2018	IR Camera Video During Dump Event
MARTINEZ T4N-R67W-S27 L01_0186_POST	.mp4	5/9/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MARTINEZ T4N-R67W-S27 L01_SIGNED EVAL	.pdf	5/16/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARTINEZ T4N-R67W-S27 L01**

Consent Decree Tank System Number: **2028**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>468</b>	<b>468</b>	
Total VCS Capacity (scfh)	<b>4,495</b>	<b>5,426</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,051</b>	<b>1,982</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff  
 Audit Document Review Date: 8/28/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARTINEZ T4N-R67W-S27 L01**

Consent Decree Tank System Number: **2028**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	
Water Tank Working Rate	<b>0</b>	
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARTINEZ T4N-R67W-S27 L01**

Consent Decree Tank System Number: **2028**

**Audit Notes**

Item A1 and A2 of the Walkdown Checklist are checked "Yes" indicating that all oil and water dump trims are consistent with the Engineering Evaluation. This will be taken as field documentation that the dump valves were replaced with 1" 1400, 1/2" trim.

There is no field documentation indicating that the LP separator PSHH was set to 60. Item B3 on the walkdown checklist is used as confirmation.

There is no field documentation that confirms the VOC line from the KO to the burner was changed from a 3" to 4" AGL.

Noble Response: The Data Request Response received on 12/10/2018 states that field verification for this facility was completed on or around 4/20/2018 and confirms that the 4" above ground VOC line from the KO to the burner was installed.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARTINSON T4N-R66W-S25 L01**

Consent Decree Tank System Number: **159**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MARTINSON T4N-R66W-S25 L01_FINAL PACKET	.pdf	9/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MARTINSON T4N-R66W-S25 L01_STEM Engineering Evaluation_rev1	.xls	9/16/2016	STEM Engineering Evaluation Spreadsheet
MARTINSON T4N-R66W-S25 L01_Final Signed STEM Plan	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MARTINSON T4N-R66W-S25 L01_FINAL PACKET	.pdf	9/16/2016	Work Request
MARTINSON T4N-R66W-S25 L01_FINAL PACKET	.pdf	9/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MARTINSON T4N-R66W-S25 L01_WALKDOWN	.pdf	9/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MARTINSON T4N-R66W-S25 L01_IR VERIFICATION	.pdf	9/13/2016	IR Verification Field Data Sheet
MARTINSON T4N-R66W-S25 L01_1492_NORMAL	.mp4	9/9/2016	IR Camera Video Normal Operations
MARTINSON T4N-R66W-S25 L01_1493_DUMP	.mp4	9/9/2016	IR Camera Video During Dump Event
MARTINSON T4N-R66W-S25 L01_1494_POST	.mp4	9/9/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MARTINSON T4N-R66W-S25 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARTINSON T4N-R66W-S25 L01**

Consent Decree Tank System Number: **159**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>23,299</b>	<b>23,299</b>	
Total VCS Capacity (scfh)	<b>26,670</b>	<b>27,899</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,924</b>	<b>23,152</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 12/13/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARTINSON T4N-R66W-S25 L01**

Consent Decree Tank System Number: **159**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MARTINSON T4N-R66W-S25 L01**

Consent Decree Tank System Number: **159**

**Audit Notes**

The Engineering Evaluation was completed with a 4" vapor line from the knockout to the combustor. Field datasheets indicate the vapor line was 2" and below ground. The work request specified that the 2" line was to be replaced with a 4" above ground line. No documentation was provided to verify a new 4" line was installed. Noble provided a response to a data request on 12/10/2018 that states "Field verification for this facility was completed on or around 8/19/2016, field verification confirmed that the 4" above ground VOC line from the knockout to the burner was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MASSEY SIAMA RURAL T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2215**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MASSEY SIAMA RURAL T4N-R65W-S31 L01_FINAL PACKET	.pdf	9/7/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MASSEY SIAMA RURAL T4N-R65W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	9/23/2016	STEM Engineering Evaluation Spreadsheet
MASSEY SIAMA RURAL T4N-R65W-S31 L01_SIGNED EVAL	.pdf	9/29/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MASSEY SIAMA RURAL T4N-R65W-S31 L01_FINAL PACKET	.pdf	9/7/2016	Work Request
MASSEY SIAMA RURAL T4N-R65W-S31 L01_FINAL PACKET	.pdf	9/7/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MASSEY SIAMA RURAL T4N-R65W-S31 L01_WALKDOWN	.pdf	9/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MASSEY SIAMA RURAL T4N-R65W-S31 L01_IR VERIFICATION	.pdf	9/2/2016	IR Verification Field Data Sheet
MASSEY SIAMA RURAL T4N-R65W-S31 L01_1462_NORMAL	.mp4	9/1/2017	IR Camera Video Normal Operations
MASSEY SIAMA RURAL T4N-R65W-S31 L01_1463_DUMP	.mp4	9/1/2017	IR Camera Video During Dump Event
MASSEY SIAMA RURAL T4N-R65W-S31 L01_1464_POST	.mp4	9/1/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MASSEY SIAMA RURAL T4N-R65W-S31 L01_SIGNED EVAL	.pdf	9/29/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MASSEY SIAMA RURAL T4N-R65W-S31 L01**

**Consent Decree Tank System Number:** **2215**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>20,995</b>	<b>20,995</b>	
Total VCS Capacity (scfh)	<b>25,084</b>	<b>25,595</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,576</b>	<b>20,906</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 4/4/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 4/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MASSEY SIAMA RURAL T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2215**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	4,689	4,508
-------	-------	-------



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MASSEY SIAMA RURAL T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2215**

**Audit Notes**

The Job Sheet, Installed Equipment page (Final Packet, pg. 37) indicates a Leed HOC 48" unit was installed for the tank burner. The Signed Engineering Evaluation utilizes a Tornado 48" unit. The Leed HOC 48" has a higher capacity than the Tornado 48", thus the use of the Tornado is a conservative approach for the engineering evaluation.

The Work Request (Final Packet, pg 5) requests the current 212 SMA oil dump valve be replaced with a 1" 1400 valve body and 1/2" trim. As a 2" or 1" valve can accommodate a 1/2" trim, it is unconfirmed which valve body size was installed as there is no provided documentation to confirm the installed oil dump valve body is a 1" model. The separator dump valve trim size is confirmed as 1/2" per the Walkdown Checklist, Item A1.

Conservatively assumed the valve to be 2", the larger available valve body size which can accommodate a 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCCARTHY T4N-R66W-S12 L01**

Consent Decree Tank System Number: **2143**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MCCARTHY T4N-R66W-S12 L01_FINAL PACKET	.pdf	3/9/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MCCARTHY T4N-R66W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	3/10/2017	STEM Engineering Evaluation Spreadsheet
MCCARTHY T4N-R66W-S12 L01_Final Signed STEM Plan	.pdf	6/8/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MCCARTHY T4N-R66W-S12 L01_FINAL PACKET	.pdf	3/9/2017	Work Request
MCCARTHY T4N-R66W-S12 L01_FINAL PACKET	.pdf	3/9/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MCCARTHY T4N-R66W-S12 L01_WALKDOWN	.pdf	3/9/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MCCARTHY T4N-R66W-S12 L01_IR VERIFICATION	.pdf	3/9/2017	IR Verification Field Data Sheet
MCCARTHY T4N-R66W-S12 L01_1846_NORMAL	.mp4	3/8/2017	IR Camera Video Normal Operations
MCCARTHY T4N-R66W-S12 L01_1847_DUMP	.mp4	3/8/2017	IR Camera Video During Dump Event
MCCARTHY T4N-R66W-S12 L01_1848_POST	.mp4	3/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MCCARTHY T4N-R66W-S12 L01_SIGNED EVAL	.pdf	4/12/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCCARTHY T4N-R66W-S12 L01**

Consent Decree Tank System Number: **2143**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>475</b>	<b>475</b>	
Total VCS Capacity (scfh)	<b>4,502</b>	<b>5,433</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,058</b>	<b>1,989</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 12/15/2017  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 11/7/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCCARTHY T4N-R66W-S12 L01**

Consent Decree Tank System Number: **2143**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCCARTHY T4N-R66W-S12 L01**

Consent Decree Tank System Number: **2143**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCCLELLAN FED T8N-R59W-S3 L01**

Consent Decree Tank System Number: **1948**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MCCLELLAN FED T8N-R59W-S3 L01_FINAL PACKET	.pdf	2/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN FED T8N-R59W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	12/15/2016	STEM Engineering Evaluation Spreadsheet
MCCLELLAN FED T8N-R59W-S3 L01_SIGNED EVAL	.pdf	12/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN FED T8N-R59W-S3 L01_FINAL PACKET	.pdf	3/28/2016	Work Request
MCCLELLAN FED T8N-R59W-S3 L01_FINAL PACKET	.pdf	6/1/2016	Construction Jobsheets
071_MCCLELLAN FED T8N-R59W-S3 L01 Tank Level	.msg	5/8/2018	Confirmation of Completion of Tank Level Automation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN FED T8N-R59W-S3 L01_WALKDOWN	.pdf	11/8/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN FED T8N-R59W-S3 L01_IR VERIFICATION	.pdf	11/3/2016	IR Verification Field Data Sheet
MCCLELLAN FED T8N-R59W-S3 L01_1041_NORMAL	.mp4	11/2/2016	IR Camera Video Normal Operations
MCCLELLAN FED T8N-R59W-S3 L01_1042_DUMP	.mp4	11/2/2016	IR Camera Video During Dump Event
MCCLELLAN FED T8N-R59W-S3 L01_1043_POST	.mp4	11/2/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN FED T8N-R59W-S3 L01_SIGNED EVAL	.pdf	12/15/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** MCCLELLAN FED T8N-R59W-S3 L01

**Consent Decree Tank System Number:** 1948

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	500
# of Water Tanks:	1
Water Tank Capacity (bbl):	500
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	175							
Dump Valve Size & Trim Size (in)	2" & 1"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	175							
Dump Valve Size & Trim Size (in)	2" & 1"							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	2			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	65,627	65,631	0%
Calculated Burner Capacity (scfh)	5,457	11,667	
Headspace Surge Capacity (scfh)	164,537	164,536	
Total VCS Capacity (scfh)	169,994	176,203	
VCS Capacity minus PPIVF (scfh)	104,367	110,572	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 1/2/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCLELLAN FED T8N-R59W-S3 L01**

Consent Decree Tank System Number: **1948**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.72</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.83</b>							
Gas/Oil Ratio (scf/bbl)	<b>348.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>633</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>188</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4120</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1433.8</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>39</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>7663</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>31</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>43</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>500</b>
scfh vapor/tank <sup>i</sup>	<b>396</b>	<b>396</b>
Mscfd	<b>19</b>	<b>10</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>59,740</b>	<b>59,740</b>
Oil Tank Working Rate	<b>1,632</b>	<b>1,628</b>
Water Tank Flash Rate	<b>1,277</b>	<b>1,277</b>
Water Tank Working Rate	<b>1,793</b>	<b>1,793</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>65,631</b>	<b>65,627</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** MCCLELLAN FED T8N-R59W-S3 L01

**Consent Decree Tank System Number:** 1948

**Audit Notes**

The STEM Engineering Evaluation file provided was "Not Solved." The solver was engaged and headspace surge rate obtained.

The separator pneumatic PSHH is set by the operator, not automation, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 175 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

The signed eval states that the certification max is 65% of the tank height and the control method is "Maintained by Tank Automation ESD." The work request specified to install automation to keep tank levels below 65% but no documentation was provided to confirm the automation was installed. In response to a data request on 5/16/2018 Noble provided an email confirming that tank automation was installed to limit the tanks to 65% full.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCCLELLAN T8N-R59W-S9 L01**

Consent Decree Tank System Number: **2054**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MCCLELLAN T8N-R59W-S9 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN T8N-R59W-S9 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
MCCLELLAN T8N-R59W-S9 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN T8N-R59W-S9 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
MCCLELLAN T8N-R59W-S9 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN T8N-R59W-S9 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN T8N-R59W-S9 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
MCCLELLAN T8N-R59W-S9 L01_0481_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
MCCLELLAN T8N-R59W-S9 L01_0482_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
MCCLELLAN T8N-R59W-S9 L01_0483_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MCCLELLAN T8N-R59W-S9 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MCCLELLAN T8N-R59W-S9 L01**

**Consent Decree Tank System Number:** **2054**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>500</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>23,339</b>	<b>23,342</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,893</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>36,467</b>	<b>36,467</b>	
Total VCS Capacity (scfh)	<b>39,360</b>	<b>42,300</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,021</b>	<b>18,959</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/24/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCCLELLAN T8N-R59W-S9 L01**

Consent Decree Tank System Number: **2054**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	5068	12689						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	20	51						
Working Flow (Mscfd) <sup>l</sup>	28	71						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	29	6

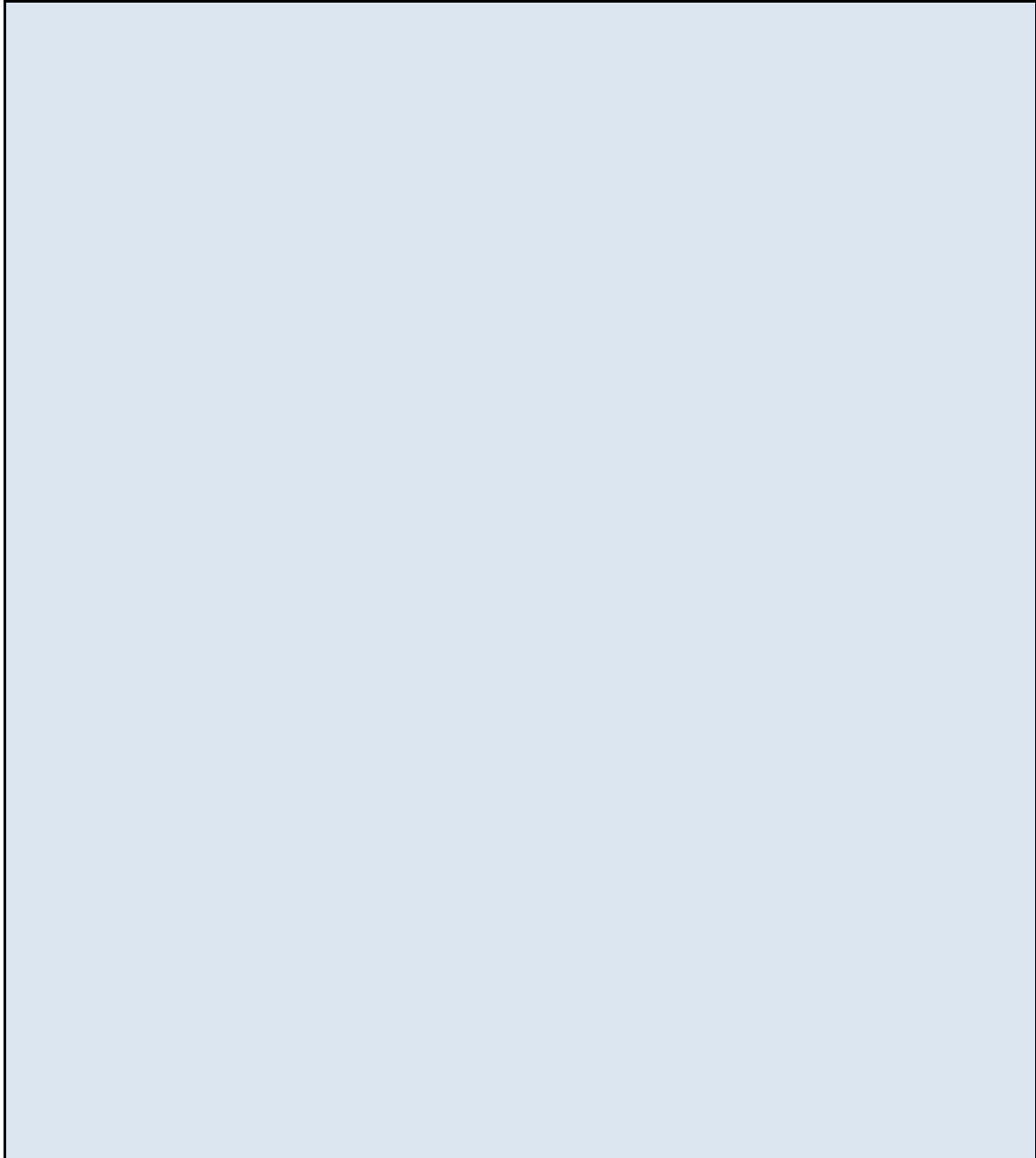
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	2,959	2,959
Water Tank Working Rate	4,154	4,154
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	2,527	2,527
Total	23,342	23,339

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCCLELLAN T8N-R59W-S9 L01**

Consent Decree Tank System Number: **2054**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCKAY FED T7N-R65W-S2 L02**

Consent Decree Tank System Number: **1971**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MCKAY FED T7N-R65W-S2 L02_FINAL PACKET	.pdf	8/27/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MCKAY FED T7N-R65W-S2 L02_STEM Engineering Evaluation_rev1	.xlsm	8/27/2018	STEM Engineering Evaluation Spreadsheet
MCKAY FED T7N-R65W-S2 L02_SIGNED EVAL	.pdf	8/27/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MCKAY FED T7N-R65W-S2 L02_FINAL PACKET	.pdf	8/27/2018	Work Request
MCKAY FED T7N-R65W-S2 L02_FINAL PACKET	.pdf	8/27/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MCKAY FED T7N-R65W-S2 L02_WALKDOWN	.pdf	8/27/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MCKAY FED T7N-R65W-S2 L02_IR VERIFICATION	.pdf	8/27/2018	IR Verification Field Data Sheet
MCKAY FED T7N-R65W-S2 L02_0060_NORMAL	.mp4	8/27/2018	IR Camera Video Normal Operations
MCKAY FED T7N-R65W-S2 L02_0061_DUMP	.mp4	8/27/2018	IR Camera Video During Dump Event
MCKAY FED T7N-R65W-S2 L02_0062_POST	.mp4	8/27/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MCKAY FED T7N-R65W-S2 L02_SIGNED EVAL	.pdf	8/27/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCKAY FED T7N-R65W-S2 L02**

Consent Decree Tank System Number: **1971**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>8</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>4</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>75</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>75</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>119</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>19,914</b>	<b>82,998</b>	<b>317%</b>
Calculated Burner Capacity (scfh)	<b>7,743</b>	<b>9,917</b>	
Headspace Surge Capacity (scfh)	<b>195,378</b>	<b>195,378</b>	
Total VCS Capacity (scfh)	<b>203,121</b>	<b>205,295</b>	
VCS Capacity minus PPIVF (scfh)	<b>183,207</b>	<b>122,297</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 8/28/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/28/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCKAY FED T7N-R65W-S2 L02**

Consent Decree Tank System Number: **1971**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.85</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.96</b>							
Gas/Oil Ratio (scf/bbl)	<b>121.3</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>107.00</b>							
Critical Pressure (psia) <sup>b</sup>	<b>544</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>88</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>12445</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1510.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>118</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>107.00</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>25945</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>104</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>146</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>500</b>
scfh vapor/tank <sup>i</sup>	<b>396</b>	<b>396</b>
Mscfd	<b>76</b>	<b>38</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>62,917</b>	<b>1,809</b>
Oil Tank Working Rate	<b>4,931</b>	<b>4,289</b>
Water Tank Flash Rate	<b>4,324</b>	<b>3,770</b>
Water Tank Working Rate	<b>6,070</b>	<b>5,291</b>
Tank Breathing Rate	<b>4,755</b>	<b>4,755</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>82,998</b>	<b>19,914</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCKAY FED T7N-R65W-S2 L02**

Consent Decree Tank System Number: **1971**

**Audit Notes**

It appears from the stem engineering evaluation model that the oil flash factor used was incorrect, thus resulting in quite a substantial difference of the calculated PPIVFR between SLR's calculations and the model Noble used. SLR has calculated an oil tank flash rate of 62,917 scfh compared to Noble's calculated rate of 1,809 scfh. This can be based on the Noble model having set the flash gas ratio to 4scf/bbl rather than using the valko-mccain. While this estimated difference of PPIVFR is large, there is no need for a data request or to rerun the model as the Total VCS Capacity is large enough to handle the PPIVFR

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCKENNEY HOFF T3N-R64W-S6 L01**

Consent Decree Tank System Number: **688**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MCKENNEY HOFF T3N-R64W-S6 L01_FINAL PACKET	.pdf	11/30/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MCKENNEY HOFF T3N-R64W-S6 L01_STEM Engineering Evaluation_rev1	.xlsm	11/22/2016	STEM Engineering Evaluation Spreadsheet
MCKENNEY HOFF T3N-R64W-S6 L01_SIGNED EVAL	.pdf	11/23/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MCKENNEY HOFF T3N-R64W-S6 L01_FINAL PACKET	.pdf	11/30/2016	Work Request
MCKENNEY HOFF T3N-R64W-S6 L01_FINAL PACKET	.pdf	11/30/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
MCKENNEY HOFF T3N-R64W-S6 L01_WALKDOWN	.pdf	11/21/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MCKENNEY HOFF T3N-R64W-S6 L01_IR VERIFICATION	.pdf	11/21/2016	IR Verification Field Data Sheet
MCKENNEY HOFF T3N-R64W-S6 L01_1723_NORMAL	.mp4	11/21/2016	IR Camera Video Normal Operations
MCKENNEY HOFF T3N-R64W-S6 L01_1724_DUMP	.mp4	11/21/2016	IR Camera Video During Dump Event
MCKENNEY HOFF T3N-R64W-S6 L01_1725_POST	.mp4	11/21/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MCKENNEY HOFF T3N-R64W-S6 L01_SIGNED EVAL	.pdf	11/23/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** MCKENNEY HOFF T3N-R64W-S6 L01

**Consent Decree Tank System Number:** 688

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,926</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>4,325</b>	<b>4,325</b>	
Total VCS Capacity (scfh)	<b>8,380</b>	<b>8,925</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,634</b>	<b>3,999</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/21/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/20/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCKENNEY HOFF T3N-R64W-S6 L01**

Consent Decree Tank System Number: **688**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,926</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCKENNEY HOFF T3N-R64W-S6 L01**

Consent Decree Tank System Number: **688**

**Audit Notes**

**Inconsistent HLP Separator Serial Number**

QC STEM Checkout (Final Packet, pg 22) form shows the HLP separator onsite as having serial number 4187L. Field Datasheet (Final Packet, pg 15) show the existing/current HLP separator onsite as having serial number 4178. SLR believes one of these serial numbers to be a typo. Therefore SLR is assuming these separators to be identical and the max separator operating pressure onsite can therefore be confirmed using the QC STEM Checkout form (Final Packet, pg 22).

**3. Oil Dump Valve Size - Unknown**

Field Datasheet (Final Packet, pg 14) shows the separator onsite (SN: 4178) originally had a 2" oil dump valve with unknown trim size. ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 7) is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation and is therefore 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HLP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**4. Inconsistent KO to Burners VOC Line Size**

The Engineering Evaluation shows a 3" VOC line from KO to burner existing onsite currently. The Job Sheet (Final Packet, pg 23) indicates a 4" above ground line from the KO to the burner was installed onsite. A larger diameter VOC line onsite as compared to that in the Engineering Evaluation results in underestimation of the vapor control system capacity, therefore the Engineering Design Standard is considered met.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCMILLEN T4N-R65W-S19 L01**

Consent Decree Tank System Number: **131**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MCMILLEN T4N-R65W-S19 L01_FINAL PACKET	.pdf	3/4/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MCMILLEN T4N-R65W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
MCMILLEN T4N-R65W-S19 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MCMILLEN T4N-R65W-S19 L01_FINAL PACKET	.pdf	3/24/2016	Work Request
MCMILLEN T4N-R65W-S19 L01_FINAL PACKET	.pdf	5/19/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
MCMILLEN T4N-R65W-S19 L01_FINAL PACKET	.pdf	6/8/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MCMILLEN T4N-R65W-S19 L01_FINAL PACKET	.pdf	6/8/2016	IR Verification Field Data Sheet
MCMILLEN T4N-R65W-S19 L01_1114_NORMAL	.mp4	6/8/2016	IR Camera Video Normal Operations
MCMILLEN T4N-R65W-S19 L01_1115_DUMP	.mp4	6/8/2016	IR Camera Video During Dump Event
MCMILLEN T4N-R65W-S19 L01_1116_POST	.mp4	6/8/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MCMILLEN T4N-R65W-S19 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCMILLEN T4N-R65W-S19 L01**

Consent Decree Tank System Number: **131**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,017</b>	<b>9,018</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,216</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>25,041</b>	<b>25,041</b>	
Total VCS Capacity (scfh)	<b>28,257</b>	<b>29,641</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,240</b>	<b>20,623</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCMILLEN T4N-R65W-S19 L01**

Consent Decree Tank System Number: **131**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94	0.94						
Valve Coefficient (gpm/psi) (C)	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	23	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
Total	9,018	9,017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MCMILLEN T4N-R65W-S19 L01**

Consent Decree Tank System Number: **131**

**Audit Notes**

Cannot confirm size of existing Tornado combustor with provided documentation. Assuming the combustor is a 48" model, typical of Noble facilities.

-A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did confirm the tank was "bottomed out " But, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks. Noble's Response to Data Request on 8/14/2018 was "Field verification for this facility was completed on or around 5/18/16, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header)."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MENONI CONAGRA T5N-R64W-S30 L01**  
**Consent Decree Tank System Number:** **317**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
043_MENONI CONAGRA T5N-R64W-S30 L01 Facility Walkdown	.pdf	2/3/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MENONI CONAGRA T5N-R64W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	6/24/2016	STEM Engineering Evaluation Spreadsheet
MENONI CONAGRA T5N-R64W-S30 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation
083_MENONI CONAGRA T5N-R64W-S30 L01_STEM Engineering Evaluation_rev1_correction	.xlsm	8/15/2018	Revised STEM Engineering Evaluation Spreadsheet

Modification Documents:

File Name	File Ext.	File Date	Document Description
MENONI CONAGRA T5N-R64W-S30 L01_FINAL PACKET	.pdf	3/15/2016	Work Request
MENONI CONAGRA T5N-R64W-S30 L01_FINAL PACKET	.pdf	5/25/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MENONI CONAGRA T5N-R64W-S30 L01_WALKDOWN	.pdf	6/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MENONI CONAGRA T5N-R64W-S30 L01_IR VERIFICATION	.pdf	6/17/2016	IR Verification Field Data Sheet
MENONI CONAGRA T5N-R64W-S30 L01_1147_NORMAL	.mp4	6/16/2016	IR Camera Video Normal Operations
MENONI CONAGRA T5N-R64W-S30 L01_1148_DUMP	.mp4	6/16/2016	IR Camera Video During Dump Event
MENONI CONAGRA T5N-R64W-S30 L01_1149_POST	.mp4	6/16/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MENONI CONAGRA T5N-R64W-S30 L01_SIGNED EVAL	.pdf	6/27/2016	Final Signed Engineering Evaluation
083_MENONI CONAGRA T5N-R64W-S30 L01_SIGNED EVAL_rev	.pdf	8/15/2018	Revised Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MENONI CONAGRA T5N-R64W-S30 L01**

Consent Decree Tank System Number: **317**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,216</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>43,502</b>	<b>43,502</b>	
Total VCS Capacity (scfh)	<b>46,718</b>	<b>48,102</b>	
VCS Capacity minus PPIVF (scfh)	<b>41,734</b>	<b>43,117</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 3/29/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MENONI CONAGRA T5N-R64W-S30 L01**

Consent Decree Tank System Number: **317**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MENONI CONAGRA T5N-R64W-S30 L01**

Consent Decree Tank System Number: **317**

**Audit Notes**

The initial Final Signed Evaluation (dated 6/27/2016) on Page 2 lists 2 tanks on site with 1 bottomed out to be used as vapor headspace. In the Facility Walkdown Page 4, there are 4 tanks listed. The job sheets in the Final Packet Page 17 reference 4 total tanks with 2 as vapor headspace.

NEI Data Request Response:

There are four (4) total tanks onsite, two (2) are in liquid service and two (2) are in vapor-only service. As such, the Engineering Evaluation submitted with File Delivery Oct 31, 2017 has been updated and is being provided in this 3rd Request Response as documents: (1) 083\_MENONI CONAGRA T5N-R64W-S30 L01\_Final Signed STEM Plan\_Rev, (2) 083\_MENONI CONAGRA T5N-R64W-S30 L01\_SIGNED EVAL\_rev and (3) 083\_MENONI CONAGRA T5N-R64W-S30 L01\_STEM Engineering Evaluation\_rev1\_correction.

NEI provided a second signed Engineering Evaluation with 4 tanks, 2 of which are headspace tanks. This evaluation is dated 7/13/2018.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MERCURE MCKINLEY T4N-R65W-S8 L01**

Consent Decree Tank System Number: **253**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
059_MERCURE MCKINLEY T4N-R65W-S8 L01 Facility Walkdown	.pdf	5/18/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
181_MERCURE MCKINLEY T4N-R65W-S8 L01_STEM Engineering Evaluation_rev1_rev	.xlsm	11/14/2018	STEM Engineering Evaluation Spreadsheet - Revised
181_MERCURE MCKINLEY T4N-R65W-S8 L01_SIGNED EVAL_rev	.pdf	11/14/2018	Final Signed Engineering Evaluation - Revised
MERCURE MCKINLEY T4N-R65W-S8 L01_SIGNED EVAL	.pdf	3/22/2017	Final Signed Engineering Evaluation - Initial
MERCURE MCKINLEY T4N-R65W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	3/21/2017	STEM Engineering Evaluation Spreadsheet - Initial

Modification Documents:

File Name	File Ext.	File Date	Document Description
MERCURE MCKINLEY T4N-R65W-S8 L01_FINAL PACKET	.pdf	3/20/2017	Work Request
MERCURE MCKINLEY T4N-R65W-S8 L01_FINAL PACKET	.pdf	3/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MERCURE MCKINLEY T4N-R65W-S8 L01_WALKDOWN	.pdf	3/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MERCURE MCKINLEY T4N-R65W-S8 L01_IR VERIFICATION	.pdf	3/20/2017	IR Verification Field Data Sheet
MERCURE MCKINLEY T4N-R65W-S8 L01_1871_NORMAL	.mp4	3/17/2017	IR Camera Video Normal Operations
MERCURE MCKINLEY T4N-R65W-S8 L01_1872_DUMP	.mp4	3/17/2017	IR Camera Video During Dump Event
MERCURE MCKINLEY T4N-R65W-S8 L01_1873_POST	.mp4	3/17/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
181_MERCURE MCKINLEY T4N-R65W-S8 L01_SIGNED EVAL_rev	.pdf	11/14/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MERCURE MCKINLEY T4N-R65W-S8 L01**

Consent Decree Tank System Number: **253**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>9,139</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>22,564</b>	<b>22,564</b>	
Total VCS Capacity (scfh)	<b>25,935</b>	<b>27,164</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,156</b>	<b>18,025</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/26/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MERCURE MCKINLEY T4N-R65W-S8 L01**

Consent Decree Tank System Number: **253**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>	<b>0.77</b>						
Z2	<b>-0.86</b>	<b>-0.86</b>						
Z3	<b>0.98</b>	<b>0.98</b>						
Z	<b>0.89</b>	<b>0.89</b>						
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>	<b>112.8</b>						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>	<b>0.78</b>						
Valve Coefficient (gpm/psi) (C)	<b>7.20</b>	<b>7.20</b>						
Critical Pressure (psia) <sup>b</sup>	<b>539</b>	<b>539</b>						
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>	<b>83</b>						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>	<b>0.85</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>	<b>827</b>						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>	<b>93.3</b>						
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>	<b>8</b>						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>7,771</b>	<b>7,440</b>
Oil Tank Working Rate	<b>655</b>	<b>626</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>9,139</b>	<b>8,779</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MERCURE MCKINLEY T4N-R65W-S8 L01**

Consent Decree Tank System Number: **253**

**Audit Notes**

Facility walkdown information provided 5/16/2018 in the 2nd Information Request Response titled 059\_MERCURE MCKINLEY T4N-R65W-S8 L01 Facility Walkdown.

The Work Request indicated the oil dump valves on remaining HLP separators were to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on either separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

Tank configuration in initial Field Data Walkdown indicates there are 3 - 300 bbl oil tanks. The 4/19/2016 STEM Work Request indicated one tank is to be placed in headspace service. The evaluation is completed with only 2 tanks, one in production service at 90% (equalization height) and the other in headspace service (0%). A data request was sent to Noble to confirm the tank configuration ( 2 tanks on site, 3 tanks on site, the number in vapor headspace service, etc.).

Noble provided information on 11/14/2018 that confirmed the configuration of one (1) vapor headspace tank and two (2) liquid production tanks on this location. Noble also provided an updated signed Engineering Evaluation with a three (3) tank battery configuration with a single (1) vapor headspace tank. The new Engineering Evaluation is documentation the Engineering Design Standard was adequately applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MEYER FRASIER USX T4N-R63W-S7 L01**

Consent Decree Tank System Number: **1415**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MEYER FRASIER USX T4N-R63W-S7 L01_FINAL PACKET	.pdf	9/21/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MEYER FRASIER USX T4N-R63W-S7 L01_STEM Engineering Evaluation_rev1	.xlsm	9/20/2016	STEM Engineering Evaluation Spreadsheet
MEYER FRASIER USX T4N-R63W-S7 L01_SIGNED EVAL	.pdf	9/20/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MEYER FRASIER USX T4N-R63W-S7 L01_FINAL PACKET	.pdf	9/21/2016	Work Request
MEYER FRASIER USX T4N-R63W-S7 L01_FINAL PACKET	.pdf	9/21/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
MEYER FRASIER USX T4N-R63W-S7 L01_WALKDOWN	.pdf	9/19/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MEYER FRASIER USX T4N-R63W-S7 L01_IR VERIFICATION	.pdf	9/19/2016	IR Verification Field Data Sheet
MEYER FRASIER USX T4N-R63W-S7 L01_1519_NORMAL	.mp4	9/19/2016	IR Camera Video Normal Operations
MEYER FRASIER USX T4N-R63W-S7 L01_1520_DUMP	.mp4	9/19/2016	IR Camera Video During Dump Event
MEYER FRASIER USX T4N-R63W-S7 L01_1521_POST	.mp4	9/19/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MEYER FRASIER USX T4N-R63W-S7 L01_SIGNED EVAL	.pdf	9/20/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** MEYER FRASIER USX T4N-R63W-S7 L01

**Consent Decree Tank System Number:** 1415

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	65							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	TEC 4-CS (48" Tornado)			
Number of Units	1			
Man. Capacity (MSCFD)	110.4			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,082	4,083	0%
Calculated Burner Capacity (scfh)	3,552	4,600	
Headspace Surge Capacity (scfh)	1,996	1,996	
Total VCS Capacity (scfh)	5,548	6,596	
VCS Capacity minus PPIVF (scfh)	1,466	2,513	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/21/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/20/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MEYER FRASIER USX T4N-R63W-S7 L01**

Consent Decree Tank System Number: **1415**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MEYER FRASIER USX T4N-R63W-S7 L01**

Consent Decree Tank System Number: **1415**

**Audit Notes**

No comment, all provided documentation is consistent with Modeling Guideline, Engineering Design Standard and itself.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MICK SHAINNE T3N-R64W-S18 L01**

Consent Decree Tank System Number: **383**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MICK SHAINNE T3N-R64W-S18 L01_FINAL PACKET	.pdf	8/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MICK SHAINNE T3N-R64W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	8/11/2017	STEM Engineering Evaluation Spreadsheet
MICK SHAINNE T3N-R64W-S18 L01_SIGNED EVAL	.pdf	8/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MICK SHAINNE T3N-R64W-S18 L01_FINAL PACKET	.pdf	8/10/2017	Work Request
MICK SHAINNE T3N-R64W-S18 L01_FINAL PACKET	.pdf	8/10/2017	Construction Jobsheets
2018 Draft Attachments to Comment Letter	.pdf	3/27/2020	Supplemental Competition Documentation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MICK SHAINNE T3N-R64W-S18 L01_FINAL PACKET	.pdf	8/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MICK SHAINNE T3N-R64W-S18 L01_IR VERIFICATION	.pdf	8/9/2017	IR Verification Field Data Sheet
MICK SHAINNE T3N-R64W-S18 L01_2245_NORMAL	.mp4	8/8/2017	IR Camera Video Normal Operations
MICK SHAINNE T3N-R64W-S18 L01_2246_DUMP	.mp4	8/8/2017	IR Camera Video During Dump Event
MICK SHAINNE T3N-R64W-S18 L01_2247_POST	.mp4	8/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MICK SHAINNE T3N-R64W-S18 L01_SIGNED EVAL	.pdf	8/16/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MICK SHAINNE T3N-R64W-S18 L01**

Consent Decree Tank System Number: **383**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,394</b>	<b>2,394</b>	
Total VCS Capacity (scfh)	<b>6,575</b>	<b>6,994</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,067</b>	<b>2,305</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 4/5/2018  
 Audit Document Review Verified by: Craig Bock & James Van Horne  
 Audit Document Verification Date: 8/3/2018 & 8/12/2020



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MICK SHAINNE T3N-R64W-S18 L01**

Consent Decree Tank System Number: **383**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	827							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,885	3,720
Oil Tank Working Rate	328	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,689</b>	<b>4,508</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MICK SHAINNE T3N-R64W-S18 L01**

Consent Decree Tank System Number: **383**

**Audit Notes**

**FINDINGS (CAB):**

CB - Item #1 in the Dump Valve Modifications section of the Stem Work Request form requests that the existing 212 dump valves be replaced with 1" 1400 and 1/2" trim. There is no indication in the Job Sheet or documentation in the Final Packet that this work was completed. However item A1 on the STEM Retrofit Walkdown Checklist confirms that the valve trim was changed. The Field Data Sheet showed the #2 separator (HPLP) was originally equipped with a 2" 212 valve with 1/2" trim. The Noble model and signed evaluation used a 1" valve with 1/2" trim for their analysis. Using a 2" valve with 1/2" trim in the SLR model causes a 4% difference in PPIVFR. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

CB - The Noble STEM model and signed evaluation used a 3" for the VOC header from the tanks to the knock-outs. The Field Data Sheets identify the line size from the tanks to the knock-outs as 2" (pg. 12 of Final Packet). A change from the 2" line to a 3" line is not listed in the Stem Work Request form or the Job Sheet. Additional data was provided in a letter date 3/27/2020 showing that the line was replaced on 2/15/2017.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILE HI SHEEP T6N-R64W-S8 L01**

Consent Decree Tank System Number: **609**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MILE HI SHEEP T6N-R64W-S8 L01_FINAL PACKET	.pdf	1/27/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MILE HI SHEEP T6N-R64W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	1/30/2017	STEM Engineering Evaluation Spreadsheet
MILE HI SHEEP T6N-R64W-S8 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MILE HI SHEEP T6N-R64W-S8 L01_FINAL PACKET	.pdf	1/27/2017	Work Request
MILE HI SHEEP T6N-R64W-S8 L01_FINAL PACKET	.pdf	1/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MILE HI SHEEP T6N-R64W-S8 L01_WALKDOWN	.pdf	1/27/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MILE HI SHEEP T6N-R64W-S8 L01_IR VERIFICATION	.pdf	1/27/2017	IR Verification Field Data Sheet
MILE HI SHEEP T6N-R64W-S8 L01_0079_NORMAL	.mp4	1/26/2017	IR Camera Video Normal Operations
MILE HI SHEEP T6N-R64W-S8 L01_0080_DUMP	.mp4	1/26/2017	IR Camera Video During Dump Event
MILE HI SHEEP T6N-R64W-S8 L01_0081_POST	.mp4	1/26/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MILE HI SHEEP T6N-R64W-S8 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILE HI SHEEP T6N-R64W-S8 L01**

Consent Decree Tank System Number: **609**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>250</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,430</b>	<b>-2%</b>
Calculated Burner Capacity (scfh)	<b>3,926</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>18,896</b>	<b>15,223</b>	
Total VCS Capacity (scfh)	<b>22,822</b>	<b>20,181</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,314</b>	<b>15,751</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 5/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILE HI SHEEP T6N-R64W-S8 L01**

Consent Decree Tank System Number: **609**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>250</b>	
scfh vapor/tank <sup>i</sup>	<b>198</b>	
Mscfd	<b>10</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>396</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,430</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILE HI SHEEP T6N-R64W-S8 L01**

Consent Decree Tank System Number: **609**

**Audit Notes**

The walkdown checklist (MILE HI SHEEP T6N-R64W-S8 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (MILE HI SHEEP T6N-R64W-S8 L01\_FINAL PACKET).

The site sketch (MILE HI SHEEP T6N-R64W-S8 L01\_FINAL PACKET, p 11) lists the oil tank #1 as one of the tanks selected to be removed along with the pit pump (MILE HI SHEEP T6N-R64W-S8 L01\_FINAL PACKET, p 3). Oil tank #2 and Oil tank #3 are listed as 250 bbl. (MILE HI SHEEP T6N-R64W-S8 L01\_FINAL PACKET, p 12). The signed evaluation (MILE HI SHEEP T6N-R64W-S8 L01\_SIGNED EVAL) and the model (MILE HI SHEEP T6N-R64W-S8 L01\_SIGNED EVAL) are both run using 300 bbl. tanks. This will result in an overestimation of PPIVF but an overestimation of surge capacity. The engineering design standard in this case is not strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T4N-R64W-S12 L01**

Consent Decree Tank System Number: **927**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L01_FINAL PACKET	.pdf	1/31/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	2/3/2017	STEM Engineering Evaluation Spreadsheet
MILLAGE T4N-R64W-S12 L01_SIGNED EVAL	.pdf	2/3/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L01_FINAL PACKET	.pdf	1/31/2017	Work Request
MILLAGE T4N-R64W-S12 L01_FINAL PACKET	.pdf	1/31/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L01_WALKDOWN	.pdf	1/27/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L01_IR VERIFICATION	.pdf	1/27/2017	IR Verification Field Data Sheet
MILLAGE T4N-R64W-S12 L01_0092_NORMAL	.mp4	1/27/2017	IR Camera Video Normal Operations
MILLAGE T4N-R64W-S12 L01_0093_DUMP	.mp4	1/27/2017	IR Camera Video During Dump Event
MILLAGE T4N-R64W-S12 L01_0094_POST	.mp4	1/27/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L01_SIGNED EVAL	.pdf	2/3/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MILLAGE T4N-R64W-S12 L01**

**Consent Decree Tank System Number:** **927**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>115</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,223</b>	<b>5,223</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,475</b>	<b>5,568</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/21/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/12/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T4N-R64W-S12 L01**

Consent Decree Tank System Number: **927**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.30</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.41</b>							
Gas/Oil Ratio (scf/bbl)	<b>198.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>579</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>128</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>574</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>114.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>5</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>4,758</b>	<b>4,758</b>
Oil Tank Working Rate	<b>227</b>	<b>227</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,223</b>	<b>5,223</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T4N-R64W-S12 L01**

Consent Decree Tank System Number: **927**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 9-14) are not dated. Date assumed to be same as Facility Scouting Date (11/12/2015).

**2. Tank Equalizer Height**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line and can therefore not be considered a control method in this case. However, headspace surge capacity was not claimed in the final signed eval and so the Engineering Design Standard can be considered strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T4N-R64W-S12 L02**

Consent Decree Tank System Number: **445**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L02_FINAL PACKET	.pdf	11/12/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L02_STEM Engineering Evaluation_rev1	.xlsm	4/15/2016	STEM Engineering Evaluation Spreadsheet
MILLAGE T4N-R64W-S12 L02_SIGNED EVAL	.pdf	4/20/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L02_FINAL PACKET	.pdf	11/17/2015	Work Request
MILLAGE T4N-R64W-S12 L02_FINAL PACKET	.pdf	2/15/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L02_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L02_IR VERIFICATION	.pdf	4/15/2016	IR Verification Field Data Sheet
MILLAGE T4N-R64W-S12 L02_0857_NORMAL	.mp4	4/14/2016	IR Camera Video Normal Operations
MILLAGE T4N-R64W-S12 L02_0858_DUMP	.mp4	4/14/2016	IR Camera Video During Dump Event
MILLAGE T4N-R64W-S12 L02_0859_POST	.mp4	4/14/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MILLAGE T4N-R64W-S12 L02_SIGNED EVAL	.pdf	4/20/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T4N-R64W-S12 L02**

Consent Decree Tank System Number: **445**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,938</b>	<b>1,938</b>	
Total VCS Capacity (scfh)	<b>5,490</b>	<b>6,538</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,809</b>	<b>2,855</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver

Audit Document Review Date: 3/29/2018

Audit Document Review Verified by: Angela M. Oberlander

Audit Document Verification Date: 4/3/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T4N-R64W-S12 L02**

Consent Decree Tank System Number: **445**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	3,683	3,681

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T4N-R64W-S12 L02**

Consent Decree Tank System Number: **445**

**Audit Notes**

1. The Work Request, pg. 3, requests the current 212 SMA oil dump valve on the HLP Separator (Millage 12-19) be replaced with a 1" 1400 valve body. As a 2" or 1" valve can accommodate a 1/2" trim, it is unconfirmed which valve body size was installed as there is no provided documentation to confirm the installed oil dump valve body is a 1" make. The HLP Separator dump valve trim size is confirmed as 1/2" per the Walkdown Checklist, Item A1.

NEI 2/20/2018 response to data request:

The Kimray 212 dump valve does not have an adjustable trim and seat, the effective "trim size" is fixed and cannot be modified. If the records positively confirm that the trim size was changed to 1/2", then the 2" Kimray 212 dump valve was replaced with the 1" 1400 valve.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T5N-R64W-S3 L01**

Consent Decree Tank System Number: **1148**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MILLAGE T5N-R64W-S3 L01_FINAL PACKET	.pdf	4/9/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T5N-R64W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	4/25/2016	STEM Engineering Evaluation Spreadsheet
MILLAGE T5N-R64W-S3 L01_SIGNED EVAL	.pdf	4/25/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T5N-R64W-S3 L01_FINAL PACKET	.pdf	4/9/2018	Work Request
MILLAGE T5N-R64W-S3 L01_FINAL PACKET	.pdf	4/9/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T5N-R64W-S3 L01_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T5N-R64W-S3 L01_IR VERIFICATION	.pdf	4/15/2016	IR Verification Field Data Sheet
MILLAGE T5N-R64W-S3 L01_0863_NORMAL	.mp4	4/14/2016	IR Camera Video Normal Operations
MILLAGE T5N-R64W-S3 L01_0864_DUMP	.mp4	4/14/2016	IR Camera Video During Dump Event
MILLAGE T5N-R64W-S3 L01_0865_POST	.mp4	4/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MILLAGE T5N-R64W-S3 L01_SIGNED EVAL	.pdf	4/25/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MILLAGE T5N-R64W-S3 L01**

**Consent Decree Tank System Number:** **1148**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 3-CS (36" Tornado)</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>58.4</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,271</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,996</b>	<b>8,267</b>	
Headspace Surge Capacity (scfh)	<b>267</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>5,263</b>	<b>8,267</b>	
VCS Capacity minus PPIVF (scfh)	<b>992</b>	<b>3,995</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/28/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/10/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLAGE T5N-R64W-S3 L01**

Consent Decree Tank System Number: **1148**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,271</b>	<b>4,271</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MILLAGE T5N-R64W-S3 L01**

**Consent Decree Tank System Number:** **1148**

**Audit Notes**

The walkdown checklist (MILLAGE T5N-R64W-S3 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (MILLAGE T5N-R64W-S3 L01\_FINAL PACKET)

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

The job sheet (MILLAGE T5N-R64W-S3 L01\_FINAL PACKET, p 21) states the PSHH was set at 65 psig, however the signed evaluation (MILLAGE T5N-R64W-S3 L01\_SIGNED EVAL, p 2), an email from Heidi Figueroa (MILLAGE T5N-R64W-S3 L01\_FINAL PACKET, p 25), and the QC Stem checklist (MILLAGE T5N-R64W-S3 L01\_FINAL PACKET, p 27) state the PSHH is 70 psig. Regardless of which setpoint is correct the modeling guideline was still strictly applied because the pressures are at or below the pressure in the signed eval.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLER T7N-R65W-S20 L01**

Consent Decree Tank System Number: **1650**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MILLER T7N-R65W-S20 L01_FINAL PACKET	.pdf	9/22/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MILLER T7N-R65W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	4/21/2017	STEM Engineering Evaluation Spreadsheet
MILLER T7N-R65W-S20 L01_SIGNED EVAL	.pdf	4/25/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MILLER T7N-R65W-S20 L01_FINAL PACKET	.pdf	9/22/2017	Work Request
MILLER T7N-R65W-S20 L01_FINAL PACKET	.pdf	9/22/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MILLER T7N-R65W-S20 L01_WALKDOWN	.pdf	3/30/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MILLER T7N-R64W-S20 L01_IR VERIFICATION	.pdf	3/30/2017	IR Verification Field Data Sheet
MILLER T7N-R64W-S20 L01_1909_NORMAL	.mp4	3/29/2017	IR Camera Video Normal Operations
MILLER T7N-R64W-S20 L01_1910_DUMP	.mp4	3/29/2017	IR Camera Video During Dump Event
MILLER T7N-R64W-S20 L01_1911_POST	.mp4	3/29/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MILLER T7N-R65W-S20 L01_SIGNED EVAL	.pdf	4/25/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MILLER T7N-R65W-S20 L01**

**Consent Decree Tank System Number:** **1650**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,433</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,207</b>	<b>2,207</b>	
Total VCS Capacity (scfh)	<b>5,134</b>	<b>8,040</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,829</b>	<b>4,608</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/18/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLER T7N-R65W-S20 L01**

Consent Decree Tank System Number: **1650**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,433</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MILLER T7N-R65W-S20 L01**

Consent Decree Tank System Number: **1650**

**Audit Notes**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOBILE PREMIX T6N-R66W-S35 L01**

Consent Decree Tank System Number: **12**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MOBILE PREMIX T6N-R66W-S35 L01_FINAL PACKET	.pdf	8/26/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MOBILE PREMIX T6N-R66W-S35 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	11/30/2017	STEM Engineering Evaluation Spreadsheet
MOBILE PREMIX T6N-R66W-S35 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MOBILE PREMIX T6N-R66W-S35 L01_FINAL PACKET	.pdf	8/26/2015	Work Request
MOBILE PREMIX T6N-R66W-S35 L01_FINAL PACKET	.pdf	8/26/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MOBILE PREMIX T6N-R66W-S35 L01_WALKDOWN	.pdf	8/26/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MOBILE PREMIX T6N-R66W-S35 L01_IR VERIFICATION	.pdf	8/14/2015	IR Verification Field Data Sheet
MOBILE PREMIX T6N-R66W-S35 L01_0223_NORMAL	.mp4	8/13/2015	IR Camera Video Normal Operations
MOBILE PREMIX T6N-R66W-S35 L01_0224_DUMP	.mp4	8/13/2015	IR Camera Video During Dump Event
MOBILE PREMIX T6N-R66W-S35 L01_0226_POST	.mp4	8/13/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MOBILE PREMIX T6N-R66W-S35 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOBILE PREMIX T6N-R66W-S35 L01**

Consent Decree Tank System Number: **12**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>	<b>2" &amp; 3/8"</b>	<b>2" &amp; 3/8"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>157</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>10,240</b>	<b>10,241</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,415</b>	<b>11,095</b>	
Headspace Surge Capacity (scfh)	<b>10,745</b>	<b>10,745</b>	
Total VCS Capacity (scfh)	<b>18,160</b>	<b>21,840</b>	
VCS Capacity minus PPIVF (scfh)	<b>7,920</b>	<b>11,599</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/30/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOBILE PREMIX T6N-R66W-S35 L01**

Consent Decree Tank System Number: **12**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77	0.77					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	0.89	0.89	0.89					
Gas/Oil Ratio (scf/bbl)	112.8	112.8	112.8					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77					
Valve Coefficient (gpm/psi) ( $C_v$ )	4.04	4.04	4.04					
Critical Pressure (psia) <sup>b</sup>	539	539	539					
Vapor Pressure (psia) <sup>c</sup>	83	83	83					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85	0.85					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	458	458	458					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	51.7	51.7	51.7					
Working Flow (Mscfd) <sup>h,i</sup>	4	4	4					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,457	6,457
Oil Tank Working Rate	544	543
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	2,527	2,527
Total	10,241	10,240



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOBILE PREMIX T6N-R66W-S35 L01**

Consent Decree Tank System Number: **12**

**Audit Notes**

The walkdown checklist (MOBILE PREMIX T6N-R66W-S35 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (MOBILE PREMIX T6N-R66W-S35 L01\_FINAL PACKET).

The STEM work request (MOBILE PREMIX T6N-R66W-S35 L01\_FINAL PACKET, p 3) requests the trims all be updated to 3/8". The job sheet (MOBILE PREMIX T6N-R66W-S35 L01\_FINAL PACKET, p 19) does not mention the trims were updated to 3/8", however the walkdown checklist (MOBILE PREMIX T6N-R66W-S35 L01\_WALKDOWN) A1 indicates the trims all match the signed eval (3/8") (MOBILE PREMIX T6N-R66W-S35 L01\_SIGNED EVAL), but it does not confirm the valve size. A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01**

Consent Decree Tank System Number: **186**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_FINAL PACKET	.pdf	4/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	4/29/2016	STEM Engineering Evaluation Spreadsheet
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_FINAL PACKET	.pdf	4/26/2016	Work Request
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_FINAL PACKET	.pdf	4/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_WALKDOWN	.pdf	4/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_IR VERIFICATION	.pdf	10/12/2017	IR Verification Field Data Sheet
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_0921_NORMAL	.mp4	4/27/2016	IR Camera Video Normal Operations
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_0922_DUMP	.mp4	4/27/2016	IR Camera Video During Dump Event
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_0923_POST	.mp4	4/27/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01**

Consent Decree Tank System Number: **186**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,364</b>	<b>7,365</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,424</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>4,400</b>	<b>4,400</b>	
Total VCS Capacity (scfh)	<b>10,824</b>	<b>14,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,460</b>	<b>7,468</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/18/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/6/2017

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01**

Consent Decree Tank System Number: **186**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.72	0.72						
Gas/Oil Ratio (scf/bbl)	96.4	96.4						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	530	530						
Vapor Pressure (psia) <sup>c</sup>	73	73						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	727	727						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1	70.1						
Working Flow (Mscfd) <sup>h,i</sup>	7	7						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	23	0

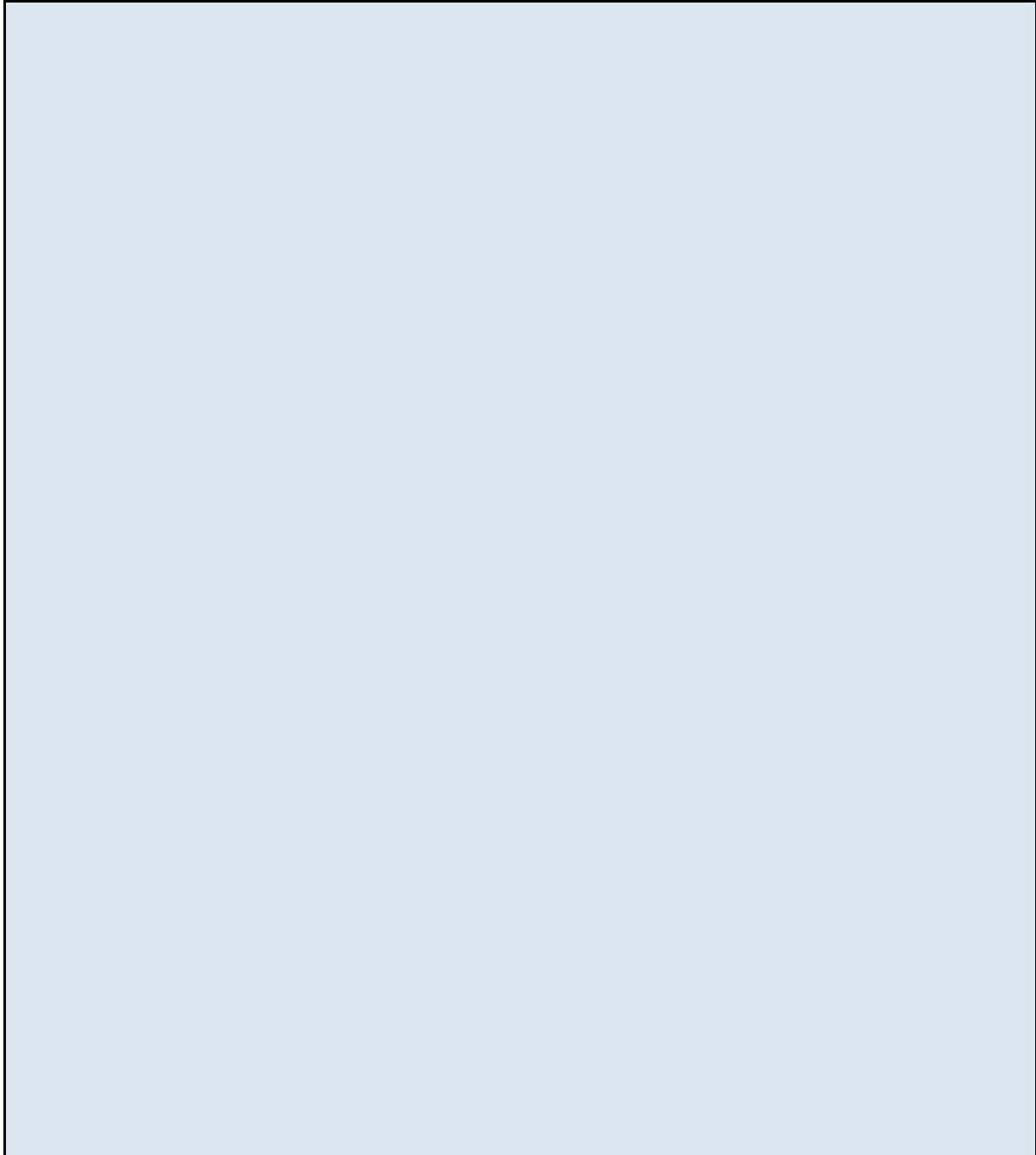
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	5,838	5,838
Oil Tank Working Rate	576	575
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>7,365</b>	<b>7,364</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT GILCREST 5RIVERS T4N-R66W-S8 L01**

Consent Decree Tank System Number: **186**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T4N-R66W-S9 L01**

Consent Decree Tank System Number: **2345/179**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_FINAL PACKET	.pdf	5/19/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_STEM Engineering Evaluation_rev1	.xlsm	5/22/2017	STEM Engineering Evaluation Spreadsheet
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_FINAL PACKET	.pdf	5/19/2017	Work Request
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_FINAL PACKET	.pdf	5/19/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_WALKDOWN	.pdf	5/19/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_IR VERIFICATION	.pdf	5/18/2017	IR Verification Field Data Sheet
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_2069_NORMAL	.mp4	5/16/2017	IR Camera Video Normal Operations
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_2070_DUMP	.mp4	5/16/2017	IR Camera Video During Dump Event
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_2071_POST	.mp4	5/16/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T4N-R66W-S9 L01 & UPRC FIVE RIVERS T4N-R66W-S9 L01_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MONFORT T4N-R66W-S9 L01**

**Consent Decree Tank System Number:** **2345/179**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,530</b>	<b>21,530</b>	
Total VCS Capacity (scfh)	<b>24,255</b>	<b>27,363</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,747</b>	<b>22,854</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 12/20/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 3/2/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T4N-R66W-S9 L01**

Consent Decree Tank System Number: **2345/179**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

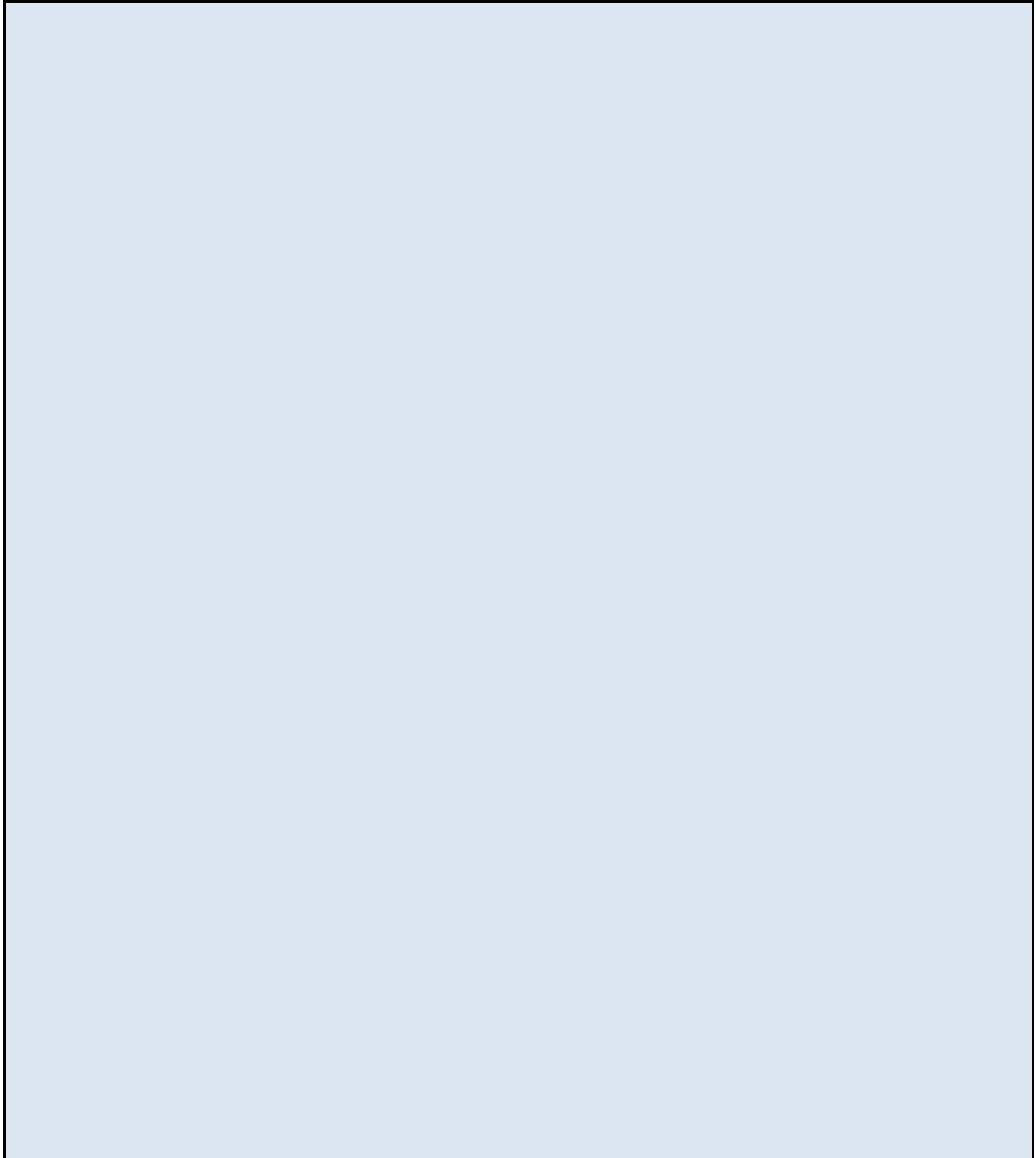


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T4N-R66W-S9 L01**

Consent Decree Tank System Number: **2345/179**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T5N-R63W-S30 L01**

Consent Decree Tank System Number: **1152**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L01_FINAL PACKET	.pdf	4/6/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	12/2/2016	STEM Engineering Evaluation Spreadsheet
MONFORT T5N-R63W-S30 L01_SIGNED EVAL	.pdf	12/12/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L01_FINAL PACKET	.pdf	4/6/2018	Work Request
MONFORT T5N-R63W-S30 L01_FINAL PACKET	.pdf	4/6/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L01_WALKDOWN	.pdf	11/30/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L01_IR VERIFICATION	.pdf	11/28/2016	IR Verification Field Data Sheet
MONFORT T5N-R63W-S30 L01_1735_NORMAL	.mp4	11/22/2016	IR Camera Video Normal Operations
MONFORT T5N-R63W-S30 L01_1736_DUMP	.mp4	11/22/2016	IR Camera Video During Dump Event
MONFORT T5N-R63W-S30 L01_1737_POST	.mp4	11/22/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L01_SIGNED EVAL	.pdf	12/12/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MONFORT T5N-R63W-S30 L01**

**Consent Decree Tank System Number:** **1152**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,387</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>2,274</b>	<b>2,274</b>	
Total VCS Capacity (scfh)	<b>5,661</b>	<b>6,827</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,579</b>	<b>2,744</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/9/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T5N-R63W-S30 L01**

Consent Decree Tank System Number: **1152**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T5N-R63W-S30 L01**

Consent Decree Tank System Number: **1152**

**Audit Notes**

The final walkdown checklist is not marked as being complete.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T5N-R63W-S30 L03**

Consent Decree Tank System Number: **1149**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L03_FINAL PACKET	.pdf	11/6/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L03_STEM Engineering Evaluation_rev1	.xlsm	1/24/2018	STEM Engineering Evaluation Spreadsheet
MONFORT T5N-R63W-S30 L03_SIGNED EVAL	.pdf	1/24/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L03_FINAL PACKET	.pdf	11/6/2015	Work Request
MONFORT T5N-R63W-S30 L03_FINAL PACKET	.pdf	11/6/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L03_WALKDOWN	.pdf	11/6/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L03_IR VERIFICATION	.pdf	11/5/2015	IR Verification Field Data Sheet
MONFORT T5N-R63W-S30 L03_0429_NORMAL	.pdf	11/4/2015	IR Camera Video Normal Operations
MONFORT T5N-R63W-S30 L03_0430_DUMP	.pdf	11/4/2015	IR Camera Video During Dump Event
MONFORT T5N-R63W-S30 L03_0431_POST	.pdf	11/4/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MONFORT T5N-R63W-S30 L03_SIGNED EVAL	.pdf	1/24/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T5N-R63W-S30 L03**

Consent Decree Tank System Number: **1149**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,587</b>	<b>3,445</b>	<b>-4%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>854</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,622</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,035</b>	<b>1,155</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/18/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T5N-R63W-S30 L03**

Consent Decree Tank System Number: **1149**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>3,049</b>
Oil Tank Working Rate	<b>288</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,587</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONFORT T5N-R63W-S30 L03**

Consent Decree Tank System Number: **1149**

**Audit Notes**

The final walkdown is not marked as being complete.

It appears the site was modeled incorrectly based upon the information provided. According to the field data sheets (PG 13 of Final Packet pdf) the oil dump valve size was 2" however the work request (PG 3 of Final packet pdf) states the dump valve size was to be changed to 1" with 1/2" trim. The job sheets (PG 20 of Final Packet pdf) verify this task was completed so the site should have been modeled accordingly however the stem engineering evaluation shows the site to have been modeled with a 2" dump valve size with 1/2" trim. The modeling guideline was still strictly applied since the signed evaluation overestimated PPIVF.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

This site has been selected for IR camera inspection due to high line pressure.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONTANA ST T8N-R59W-S16 L01**

Consent Decree Tank System Number: **1974**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MONTANA ST T8N-R59W-S16 L01_FINAL PACKET	.pdf	9/22/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MONTANA ST T8N-R59W-S16 L01_STEM Engineering Evaluation_rev1	.xlsm	7/13/2017	STEM Engineering Evaluation Spreadsheet
MONTANA ST T8N-R59W-S16 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MONTANA ST T8N-R59W-S16 L01_FINAL PACKET	.pdf	9/22/2017	Work Request
MONTANA ST T8N-R59W-S16 L01_FINAL PACKET	.pdf	9/22/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
MONTANA ST T8N-R59W-S16 L01_WALKDOWN	.pdf	11/8/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MONTANA ST T8N-R59W-S16 L01_IR VERIFICATION	.pdf	11/4/2016	IR Verification Field Data Sheet
MONTANA ST T8N-R59W-S16 L01_1095_NORMAL	.mp4	11/3/2016	IR Camera Video Normal Operations
MONTANA ST T8N-R59W-S16 L01_1096_DUMP	.mp4	11/3/2016	IR Camera Video During Dump Event
MONTANA ST T8N-R59W-S16 L01_1097_POST	.mp4	11/3/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MONTANA ST T8N-R59W-S16 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MONTANA ST T8N-R59W-S16 L01**

**Consent Decree Tank System Number:** **1974**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>433.333</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>150</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>150</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>131,866</b>	<b>131,878</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,046</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>297,048</b>	<b>297,048</b>	
Total VCS Capacity (scfh)	<b>303,094</b>	<b>307,434</b>	
VCS Capacity minus PPIVF (scfh)	<b>171,228</b>	<b>175,557</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 1/2/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 1/16/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONTANA ST T8N-R59W-S16 L01**

Consent Decree Tank System Number: **1974**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.57</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.68</b>							
Gas/Oil Ratio (scf/bbl)	<b>281.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.76</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>57.00</b>							
Critical Pressure (psia) <sup>b</sup>	<b>610</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>163</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>9942</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>2794.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>95</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.76</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>57.00</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>18881</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>76</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>106</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>433</b>	<b>500</b>
scfh vapor/tank <sup>i</sup>	<b>343</b>	<b>396</b>
Mscfd	<b>25</b>	<b>10</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>116,421</b>	<b>116,421</b>
Oil Tank Working Rate	<b>3,939</b>	<b>3,930</b>
Water Tank Flash Rate	<b>3,147</b>	<b>3,146</b>
Water Tank Working Rate	<b>4,417</b>	<b>4,416</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>131,878</b>	<b>131,866</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** MONTANA ST T8N-R59W-S16 L01

**Consent Decree Tank System Number:** 1974

**Audit Notes**

The walkdown checklist (MONTANA ST T8N-R59W-S16 L01\_WALKDOWN) was not marked as completed. Completion was verified through other documentation in the final packet (MONTANA ST T8N-R59W-S16 L01\_FINAL PACKET).

The MONTANA ST T8N-R59W-S16 L01 site has (2) 500 bbl oil tanks and (1) 300 bbl oil tank. The average space of these tanks, 433.33 bbl, was used in the STEM calculations.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONTERA T6N-R66W-S11 L01**

Consent Decree Tank System Number: **1502**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MONTERA T6N-R66W-S11 L01_FINAL PACKET	.pdf	5/4/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MONTERA T6N-R66W-S11 L01_STEM Engineering Evaluation_rev1	.xlsm	5/6/2016	STEM Engineering Evaluation Spreadsheet
MONTERA T6N-R66W-S11 L01_SIGNED EVAL	.pdf	5/24/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MONTERA T6N-R66W-S11 L01_FINAL PACKET	.pdf	5/4/2016	Work Request
MONTERA T6N-R66W-S11 L01_FINAL PACKET	.pdf	5/4/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MONTERA T6N-R66W-S11 L01_WALKDOWN	.pdf	5/4/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MONTERA T6N-R66W-S11 L01_IR VERIFICATION	.pdf	5/4/2016	IR Verification Field Data Sheet
MONTERA T6N-R66W-S11 L01_0935_NORMAL	.mp4	5/3/2016	IR Camera Video Normal Operations
MONTERA T6N-R66W-S11 L01_0936_DUMP	.mp4	5/3/2016	IR Camera Video During Dump Event
MONTERA T6N-R66W-S11 L01_0937_POST	.mp4	5/3/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MONTERA T6N-R66W-S11 L01_SIGNED EVAL	.pdf	5/24/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONTERA T6N-R66W-S11 L01**

Consent Decree Tank System Number: **1502**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,587</b>	<b>3,445</b>	<b>-4%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>646</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,414</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>827</b>	<b>1,155</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/21/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONTERA T6N-R66W-S11 L01**

Consent Decree Tank System Number: **1502**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>3,049</b>
Oil Tank Working Rate	<b>288</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,587</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MONTERA T6N-R66W-S11 L01**

Consent Decree Tank System Number: **1502**

**Audit Notes**

The walkdown checklist (MONTERA T6N-R66W-S11 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (MONTERA T6N-R66W-S11 L01\_FINAL PACKET).

The STEM work request (MONTERA T6N-R66W-S11 L01\_FINAL PACKET, p 3) requests the existing HLP separator be replaced with a B-grade 1000# separator and to confirm the oil dump valves to have a 1/2" trim. The Job sheet (MONTERA T6N-R66W-S11 L01\_FINAL PACKET, p 22) confirms the oil dump is a 1" valve with a 1/2" trim. This made for a 4% overestimation in PPIVFR.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSER T3N-R65W-S22 L01**

Consent Decree Tank System Number: **434**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S22 L01_FINAL PACKET	.pdf	7/21/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S22 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
MOSER T3N-R65W-S22 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S22 L01_FINAL PACKET	.pdf	10/8/2015	Work Request
MOSER T3N-R65W-S22 L01_FINAL PACKET	.pdf	10/30/2015	Construction Jobsheets
236_MOSER T3N-R65W-S22 L01 TLO Final Packet	.pdf	11/9/2015	Truck Loadout Packet

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S22 L01_WALKDOWN	.pdf	12/9/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S22 L01_IR VERIFICATION	.pdf	12/8/2015	IR Verification Field Data Sheet
MOSER T3N-R65W-S22 L01_0474_NORMAL	.mp4	12/1/2015	IR Camera Video Normal Operations
MOSER T3N-R65W-S22 L01_0476_DUMP	.mp4	12/1/2015	IR Camera Video During Dump Event
MOSER T3N-R65W-S22 L01_0477_POST	.mp4	12/1/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S22 L01_SIGNED EVAL	.pdf	7/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** MOSER T3N-R65W-S22 L01

**Consent Decree Tank System Number:** 434

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>300</b>
Oil Tank Capacity (bbl):	<b>3</b>
# of Water Tanks:	<b>300</b>
Water Tank Capacity (bbl):	<b>1</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>300</b>	<b>65</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>					

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,568</b>	<b>13,570</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,046</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>42,936</b>	<b>42,936</b>	
Total VCS Capacity (scfh)	<b>48,982</b>	<b>53,322</b>	
VCS Capacity minus PPIVF (scfh)	<b>35,414</b>	<b>39,752</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 4/2/2018 & 12/14/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSER T3N-R65W-S22 L01**

Consent Decree Tank System Number: **434**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	0.80							
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1379							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	144.1							
Working Flow (Mscfd) <sup>h,i</sup>	13							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	0.78	0.94	0.78					
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	5.72	7.20					
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200					
Vapor Pressure (psia) <sup>k</sup>	1	1	1					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bwpd) <sup>f,g</sup>	3906	3254	1685					

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	16	13	7					
Working Flow (Mscfd) <sup>l</sup>	22	18	9					

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	3	1
scfh vapor/tank <sup>i</sup>	2	1
Mscfd	17	6

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,002	6,002
Oil Tank Working Rate	546	545
Water Tank Flash Rate	1,474	1,474
Water Tank Working Rate	2,069	2,069
Tank Breathing Rate	951	951
Truck Loading Vapor	2,527	2,527
Total	13,570	13,568

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSER T3N-R65W-S22 L01**

Consent Decree Tank System Number: **434**

**Audit Notes**

The Engineering Evaluation was completed with three oil tanks one of which was a headspace tank and one water tank. There is no work request to create a headspace tank but truck loadout vapor collection system was installed. No documentation is provided to verify that one of the oil tanks was converted to a headspace tank. Noble provided Truck Loadout Installation with a date of 11/9/2015 in response to a data request on 12/10/2018 that confirmed the creation of one headspace tank.

-Note that the 2nd tank in all videos labeled "Work Tank" was not filmed in IR mode.

The engineering evaluation was completed with one lead 48", and one 48" Cimarron combustor. Work Request specified that the existing 48" Cimarron combustor on site was to be connected to the tank VOC header. No documentation was provided confirming this was completed. In response to the data request dated 12/10/2018 Noble verified that a Cimarron 48" HV ECD was connected to tank vapors.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSER T3N-R65W-S34 L05**

Consent Decree Tank System Number: **413**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S34 L05_FINAL PACKET	.pdf	2/12/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S34 L05_STEM Engineering Evaluation_rev1	.xlsm	8/15/2016	STEM Engineering Evaluation Spreadsheet
MOSER T3N-R65W-S34 L05_Final Signed STEM Plan	.pdf	10/19/2016	Final Signed Engineering Evaluation
123_MOSER T3N-R65W-S34 L05_STEM Engineering Evaluation_rev1 Update	.xlsm	11/14/2018	STEM Engineering Evaluation Spreadsheet
123_MOSER T3N-R65W-S34 L05_Final Signed STEM Plan_Rev	.pdf	11/14/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S34 L05_FINAL PACKET	.pdf	2/12/2018	Work Request
MOSER T3N-R65W-S34 L05_FINAL PACKET	.pdf	2/12/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S34 L05_WALKDOWN	.pdf	8/9/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S34 L05_IR VERIFICATION	.pdf	8/5/2016	IR Verification Field Data Sheet
MOSER T3N-R65W-S34 L05_1361_NORMAL	.mp4	8/3/2016	IR Camera Video Normal Operations
MOSER T3N-R65W-S34 L05_1362_DUMP	.mp4	8/3/2016	IR Camera Video During Dump Event
MOSER T3N-R65W-S34 L05_1363_POST	.mp4	8/3/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
MOSER T3N-R65W-S34 L05_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation
123_MOSER T3N-R65W-S34 L05_SIGNED EVAL_rev	.pdf	11/14/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MOSER T3N-R65W-S34 L05**

**Consent Decree Tank System Number:** **413**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>3,334</b>	<b>20,399</b>	
Total VCS Capacity (scfh)	<b>6,705</b>	<b>24,999</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,959</b>	<b>20,252</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 2/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSER T3N-R65W-S34 L05**

Consent Decree Tank System Number: **413**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSER T3N-R65W-S34 L05**

Consent Decree Tank System Number: **413**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

The work request (pg. 3 FINAL PACKET) states that the #1 oil tank needs to be disconnected from the fill header to be used as a headspace-only tank. There is no verification (pg 13-29 FINAL PACKET) that this was completed.

**NOBLE RESPONSE**

Field verification for this facility was completed on or around 10/5/2018, field verification confirmed that one tank was not converted into a headspace tank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSIER FED T4N-R66W-S23 L01**

Consent Decree Tank System Number: **127**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
MOSIER FED T4N-R66W-S23 L01_FINAL PACKET	.pdf	3/2/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
MOSIER FED T4N-R66W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	3/11/2016	STEM Engineering Evaluation Spreadsheet
MOSIER FED T4N-R66W-S23 L01_SIGNED EVAL	.pdf	3/14/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
MOSIER FED T4N-R66W-S23 L01_FINAL PACKET	.pdf	3/2/2016	Work Request
MOSIER FED T4N-R66W-S23 L01_FINAL PACKET	.pdf	3/2/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
202_MOSIER FED T4N-R66W-S23 L01_Facility Walkdown	.pdf	11/14/2018	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
MOSIER FED T4N-R66W-S23 L01_IR VERIFICATION	.pdf	3/2/2016	IR Verification Field Data Sheet
MOSIER FED T4N-R66W-S23 L01_0732_NORMAL	.mp4	3/1/2016	IR Camera Video Normal Operations
MOSIER FED T4N-R66W-S23 L01_0733_DUMP	.mp4	3/1/2016	IR Camera Video During Dump Event
MOSIER FED T4N-R66W-S23 L01_0734_POST	.mp4	3/1/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
MOSIER FED T4N-R66W-S23 L01_SIGNED EVAL	.pdf	3/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **MOSIER FED T4N-R66W-S23 L01**

**Consent Decree Tank System Number:** **127**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>8,781</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>20,418</b>	<b>20,418</b>	
Total VCS Capacity (scfh)	<b>23,334</b>	<b>26,251</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,555</b>	<b>17,471</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 12/12/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSIER FED T4N-R66W-S23 L01**

Consent Decree Tank System Number: **127**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94	0.94						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>l</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	8,781	8,779
-------	-------	-------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **MOSIER FED T4N-R66W-S23 L01**

Consent Decree Tank System Number: **127**

**Audit Notes**

The original information for this location was lacking the Facility Walkdown packet. Noble provided the field data sheet on 11/10/2018 to complete the audit evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NAPOLEAN T5N-R66W-S7 L01**

Consent Decree Tank System Number: **1283**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
NAPOLEAN T5N-R66W-S7 L01_FINAL PACKET	.pdf	1/7/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
NAPOLEAN T5N-R66W-S7 L01_STEM Engineering Evaluation_rev1	.xls	11/21/2017	STEM Engineering Evaluation Spreadsheet
NAPOLEAN T5N-R66W-S7 L01_Final Signed STEM Plan	.pdf	1/17/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
NAPOLEAN T5N-R66W-S7 L01_FINAL PACKET	.pdf	1/7/2016	Work Request
NAPOLEAN T5N-R66W-S7 L01_FINAL PACKET	.pdf	1/7/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
NAPOLEAN T5N-R66W-S7 L01_WALKDOWN	.pdf	1/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
NAPOLEAN T5N-R66W-S7 L01_IR VERIFICATION	.pdf	1/6/2016	IR Verification Field Data Sheet
NAPOLEAN T5N-R66W-S7 L01_0569_NORMAL	.mp4	1/5/2016	IR Camera Video Normal Operations
NAPOLEAN T5N-R66W-S7 L01_0570_DUMP	.mp4	1/5/2016	IR Camera Video During Dump Event
NAPOLEAN T5N-R66W-S7 L01_0571_POST	.mp4	1/5/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
NAPOLEAN T5N-R66W-S7 L01_SIGNED EVAL	.pdf	12/5/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NAPOLEAN T5N-R66W-S7 L01**

Consent Decree Tank System Number: **1283**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>62</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,602</b>	<b>3,602</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>607</b>	<b>607</b>	
Total VCS Capacity (scfh)	<b>4,375</b>	<b>5,207</b>	
VCS Capacity minus PPIVF (scfh)	<b>773</b>	<b>1,605</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess

Audit Document Review Date: 2/20/2018

Audit Document Review Verified by: Jesse Hanshaw

Audit Document Verification Date: 5/29/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NAPOLEAN T5N-R66W-S7 L01**

Consent Decree Tank System Number: **1283**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.64</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.76</b>							
Gas/Oil Ratio (scf/bbl)	<b>99.6</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>532</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>75</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>740</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,071</b>	<b>3,071</b>
Oil Tank Working Rate	<b>293</b>	<b>293</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,602</b>	<b>3,602</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NAPOLEAN T5N-R66W-S7 L01**

Consent Decree Tank System Number: **1283**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02**

Consent Decree Tank System Number: **1356**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_FINAL PACKET	.pdf	1/17/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_STEM Engineering Evaluation_rev1	.xlsm	4/27/2016	STEM Engineering Evaluation Spreadsheet
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_SIGNED EVAL	.pdf	4/27/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_FINAL PACKET	.pdf	1/17/2018	Work Request
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_FINAL PACKET	.pdf	1/17/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_WALKDOWN	.pdf	4/22/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_IR VERIFICATION	.pdf	4/22/2016	IR Verification Field Data Sheet
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_906_Normal	.mp4	4/22/2016	IR Camera Video Normal Operations
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_907_Dump	.mp4	4/22/2016	IR Camera Video During Dump Event
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_908_Post	.mp4	4/22/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02_SIGNED EVAL	.pdf	4/27/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02**

**Consent Decree Tank System Number:** **1356**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>583</b>	<b>1,371</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 6/4/2018

Audit Document Review Verified by: Patrick Dilsaver

Audit Document Verification Date: 9/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02**

Consent Decree Tank System Number: **1356**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NATL HOG FARMS 70 RANCH T5N-R63W-S21 L02**

Consent Decree Tank System Number: **1356**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Job Sheet (Final Packet, pg 22) and pg 24 of the Final Packet indicate a new LP separator with unknown oil dump valve and trim size was installed onsite . ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 17) is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve is installed on the LP separator. For the given trim size, ½", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NORRIS HP FARMS T3N-R64W-S32 L01**

Consent Decree Tank System Number: **421**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
NORRIS HP FARMS T3N-R64W-S32 L01_FINAL PACKET	.pdf	10/7/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
NORRIS HP FARMS T3N-R64W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
NORRIS HP FARMS T3N-R64W-S32 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
NORRIS HP FARMS T3N-R64W-S32 L01_FINAL PACKET	.pdf	10/7/2015	Work Request
NORRIS HP FARMS T3N-R64W-S32 L01_FINAL PACKET	.pdf	10/7/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
NORRIS HP FARMS T3N-R64W-S32 L01_WALKDOWN	.pdf	9/30/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
NORRIS HP FARMS T3N-R64W-S32 L01_IR VERIFICATION	.pdf	9/30/2015	IR Verification Field Data Sheet
NORRIS HP FARMS T3N-R64W-S32 L01_0293_NORMAL	.mp4	9/30/2015	IR Camera Video Normal Operations
NORRIS HP FARMS T3N-R64W-S32 L01_0294_DUMP	.mp4	9/30/2015	IR Camera Video During Dump Event
NORRIS HP FARMS T3N-R64W-S32 L01_0295_POST	.mp4	9/30/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
NORRIS HP FARMS T3N-R64W-S32 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **NORRIS HP FARMS T3N-R64W-S32 L01**

**Consent Decree Tank System Number:** **421**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>10,709</b>	<b>10,711</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,021</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>19,017</b>	<b>19,017</b>	
Total VCS Capacity (scfh)	<b>23,038</b>	<b>23,617</b>	
VCS Capacity minus PPIVF (scfh)	<b>12,329</b>	<b>12,906</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:  
 Audit Document Review Date:  
 Audit Document Review Verified by:  
 Audit Document Verification Date:

Brian Cherwien  
 \_\_\_\_\_  
 7/24/2018  
 \_\_\_\_\_  
 Angela M. Oberlander  
 \_\_\_\_\_  
 9/6/2018  
 \_\_\_\_\_





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NORRIS HP FARMS T3N-R64W-S32 L01**

Consent Decree Tank System Number: **421**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2213</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>213.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>21</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

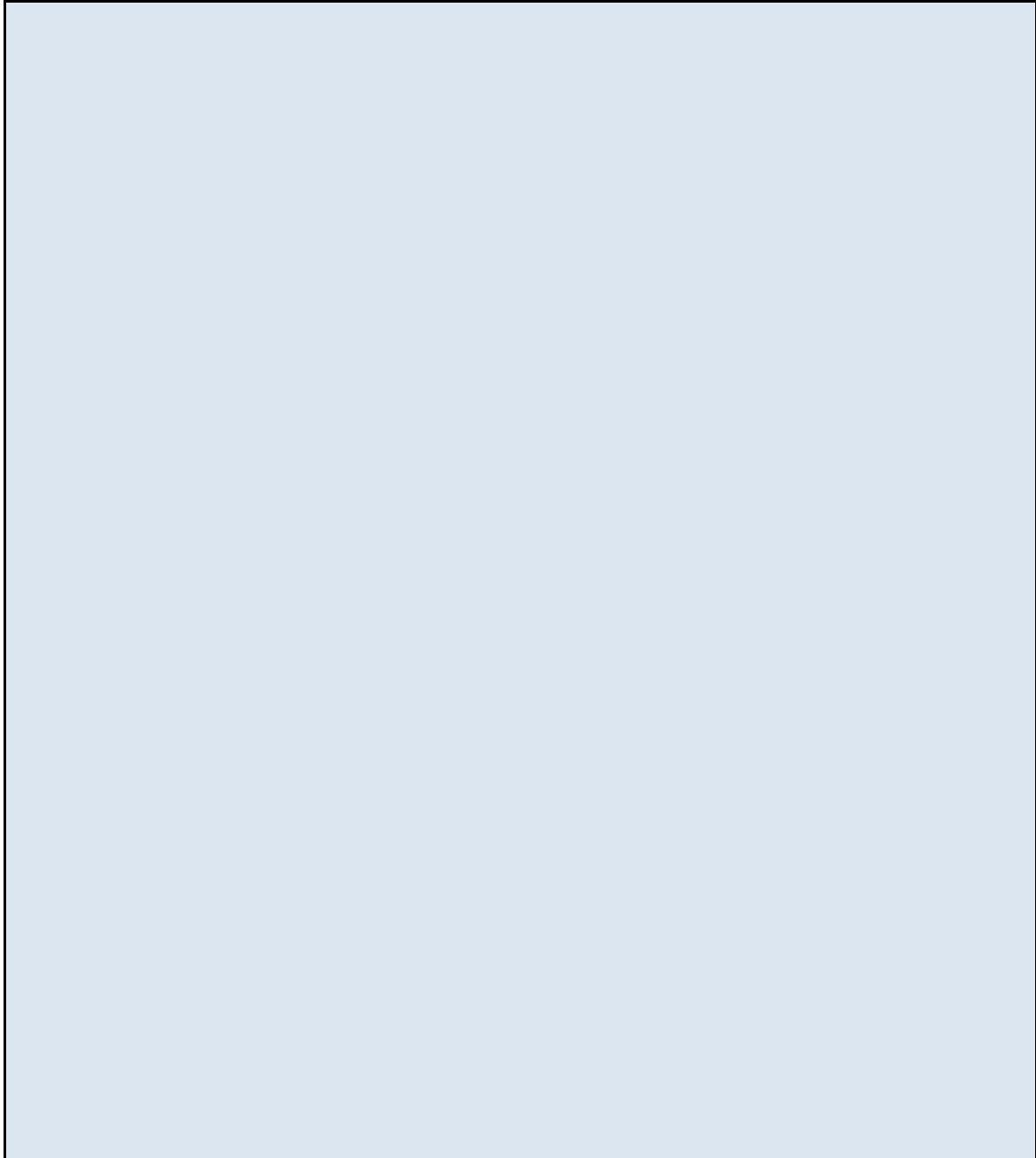
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>8,883</b>	<b>8,883</b>
Oil Tank Working Rate	<b>877</b>	<b>875</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>10,711</b>	<b>10,709</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **NORRIS HP FARMS T3N-R64W-S32 L01**

Consent Decree Tank System Number: **421**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Norris Pioneer T2N-R64W-S8 L01**

Consent Decree Tank System Number: **1159**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
NORRIS PIONEER T2N-R64W-S8 L01_FINAL PACKET	.pdf	11/15/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
NORRIS PIONEER T2N-R64W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	11/14/2016	STEM Engineering Evaluation Spreadsheet
NORRIS PIONEER T2N-R64W-S8 L01_Final Signed STEM Plan	.pdf	1/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
NORRIS PIONEER T2N-R64W-S8 L01_FINAL PACKET	.pdf	11/15/2016	Work Request
NORRIS PIONEER T2N-R64W-S8 L01_FINAL PACKET	.pdf	11/15/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
NORRIS PIONEER T2N-R64W-S8 L01_WALKDOWN	.pdf	11/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
NORRIS PIONEER T2N-R64W-S8 L01_IR VERIFICATION	.pdf	11/14/2016	IR Verification Field Data Sheet
NORRIS PIONEER T2N-R64W-S8 L01_1693_NORMAL	.mp4	11/10/2016	IR Camera Video Normal Operations
NORRIS PIONEER T2N-R64W-S8 L01_1694_DUMP	.mp4	11/10/2016	IR Camera Video During Dump Event
NORRIS PIONEER T2N-R64W-S8 L01_1695_POST	.mp4	11/10/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
NORRIS PIONEER T2N-R64W-S8 L01_SIGNED EVAL	.pdf	11/17/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Norris Pioneer T2N-R64W-S8 L01**

Consent Decree Tank System Number: **1159**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>19,294</b>	<b>19,294</b>	
Total VCS Capacity (scfh)	<b>22,019</b>	<b>25,127</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,511</b>	<b>20,439</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/22/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Norris Pioneer T2N-R64W-S8 L01**

Consent Decree Tank System Number: **1159**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Norris Pioneer T2N-R64W-S8 L01**

Consent Decree Tank System Number: **1159**

**Audit Notes**

The Walkdown Checklist (NORRIS PIONEER T2N-R64W-S8 L01\_WALKDOWN) was not marked as complete. Completion of the work request was done through other documentation in the final packet (NORRIS PIONEER T2N-R64W-S8 L01\_FINAL PACKET).

Per the Work Request (NORRIS PIONEER T2N-R64W-S8 L01\_FINAL PACKET.pdf, pg. 3) a new LP Separator was to be installed on the site. The Job Sheet (NORRIS PIONEER T2N-R64W-S8 L01\_FINAL PACKET.pdf, pg. 35) confirmed the LP separator was installed, but it does not indicate the oil dump valve size. A1 of the Final Walkdown form (ANDERSON MARLEY NORRIS PIONEER T2N-R64W-S8 L01\_WALKDOWN.pdf, pg. 1) indicates the trim has been verified, but no documentation on the actual valve size. A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

This site was selected for an additional IR Camera inspection because it was partly filmed looking directly into the sun.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA SHELTON T4N-R65W-S25 L01**

Consent Decree Tank System Number: **677**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
OCOMA SHELTON T4N-R65W-S25 L01_FINAL PACKET	.pdf	8/8/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
OCOMA SHELTON T4N-R65W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	8/18/2017	STEM Engineering Evaluation Spreadsheet
OCOMA SHELTON T4N-R65W-S25 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
OCOMA SHELTON T4N-R65W-S25 L01_FINAL PACKET	.pdf	8/8/2017	Work Request
OCOMA SHELTON T4N-R65W-S25 L01_FINAL PACKET	.pdf	8/8/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
OCOMA SHELTON T4N-R65W-S25 L01_WALKDOWN	.pdf	8/8/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
OCOMA SHELTON T4N-R65W-S25 L01_IR VERIFICATION	.pdf	3/22/2018	IR Verification Field Data Sheet
OCOMA SHELTON T4N-R65W-S25 L01_2231_NORMAL	.mp4	8/7/2017	IR Camera Video Normal Operations
OCOMA SHELTON T4N-R65W-S25 L01_2232_DUMP	.mp4	8/7/2017	IR Camera Video During Dump Event
OCOMA SHELTON T4N-R65W-S25 L01_2233_POST	.mp4	8/7/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
OCOMA SHELTON T4N-R65W-S25 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA SHELTON T4N-R65W-S25 L01**

Consent Decree Tank System Number: **677**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,878</b>	<b>1,878</b>	
Total VCS Capacity (scfh)	<b>5,430</b>	<b>6,478</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,125</b>	<b>3,171</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/18/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA SHELTON T4N-R65W-S25 L01**

Consent Decree Tank System Number: **677**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_T$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_T$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA SHELTON T4N-R65W-S25 L01**

Consent Decree Tank System Number: **677**

**Audit Notes**

The Walkdown checklist (OCOMA SHELTON T4N-R65W-S25 L01\_WALKDOWN) was not marked as complete. Completion of STEM work request was verified through other documentation in the final packet (OCOMA SHELTON T4N-R65W-S25 L01\_FINAL PACKET).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA T4N-R64W-S31 L02**

Consent Decree Tank System Number: **678**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R64W-S31 L02_FINAL PACKET	.pdf	2/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R64W-S31 L02_STEM Engineering Evaluation_rev1	.xls	12/19/2016	STEM Engineering Evaluation Spreadsheet
OCOMA T4N-R64W-S31 L02_Final Signed STEM Plan	.pdf	1/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R64W-S31 L02_FINAL PACKET	.pdf	2/24/2016	Work Request
OCOMA T4N-R64W-S31 L02_FINAL PACKET	.pdf	2/24/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R64W-S31 L02_WALKDOWN	.pdf	11/14/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R64W-S31 L02_IR VERIFICATION	.pdf	11/14/2017	IR Verification Field Data Sheet
OCOMA T4N-R64W-S31 L02_0718_NORMAL	.mp4	2/19/2016	IR Camera Video Normal Operations
OCOMA T4N-R64W-S31 L02_0719_DUMP	.mp4	2/19/2016	IR Camera Video During Dump Event
OCOMA T4N-R64W-S31 L02_0720_POST	.mp4	2/19/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R64W-S31 L02_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA T4N-R64W-S31 L02**

Consent Decree Tank System Number: **678**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,867</b>	<b>2,867</b>	
Total VCS Capacity (scfh)	<b>5,794</b>	<b>8,700</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,712</b>	<b>4,617</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 1/5/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/18/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA T4N-R64W-S31 L02**

Consent Decree Tank System Number: **678**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA T4N-R64W-S31 L02**

Consent Decree Tank System Number: **678**

**Audit Notes**

The walkdown checklist was not marked as everything on the work request form was completed. Verification of completion was found in other documentation in the final packet.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA T4N-R65W-S25 L01**

Consent Decree Tank System Number: **1171**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R65W-S25 L01_FINAL PACKET	.pdf	4/9/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R65W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	9/1/2016	STEM Engineering Evaluation Spreadsheet
OCOMA T4N-R65W-S25 L01_SIGNED EVAL	.pdf	9/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R65W-S25 L01_FINAL PACKET	.pdf	4/9/2018	Work Request
OCOMA T4N-R65W-S25 L01_FINAL PACKET	.pdf	4/9/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R65W-S25 L01_WALKDOWN	.pdf	8/30/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R65W-S25 L01_IR VERIFICATION	.pdf	8/26/2016	IR Verification Field Data Sheet
OCOMA T4N-R65W-S25 L01_1437_NORMAL	.mp4	8/25/2016	IR Camera Video Normal Operations
OCOMA T4N-R65W-S25 L01_1438_DUMP	.mp4	8/25/2016	IR Camera Video During Dump Event
OCOMA T4N-R65W-S25 L01_1439_POST	.mp4	8/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
OCOMA T4N-R65W-S25 L01_SIGNED EVAL	.pdf	9/6/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA T4N-R65W-S25 L01**

Consent Decree Tank System Number: **1171**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>657</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,323</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>879</b>	<b>1,514</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 9/18/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA T4N-R65W-S25 L01**

Consent Decree Tank System Number: **1171**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_T$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_T$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OCOMA T4N-R65W-S25 L01**

Consent Decree Tank System Number: **1171**

**Audit Notes**

The walkdown checklist (OCOMA T4N-R65W-S25 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (OCOMA T4N-R65W-S25 L01\_FINAL PACKET).

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ODLE T5N-R63W-S19 L01**

Consent Decree Tank System Number: **1175**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ODLE T5N-R63W-S19 L01_FINAL PACKET	.pdf	1/14/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ODLE T5N-R63W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	1/11/2018	STEM Engineering Evaluation Spreadsheet
ODLE T5N-R63W-S19 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ODLE T5N-R63W-S19 L01_FINAL PACKET	.pdf	1/14/2016	Work Request
ODLE T5N-R63W-S19 L01_FINAL PACKET	.pdf	1/14/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ODLE T5N-R63W-S19 L01_WALKDOWN	.pdf	1/14/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ODLE T5N-R63W-S19 L01_IR VERIFICATION	.pdf	1/14/2016	IR Verification Field Data Sheet
ODLE T5N-R63W-S19 L01_0581_NORMAL	.mp4	1/11/2016	IR Camera Video Normal Operations
ODLE T5N-R63W-S19 L01_0582_DUMP	.mp4	1/11/2016	IR Camera Video During Dump Event
ODLE T5N-R63W-S19 L01_0583_POST	.mp4	1/11/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ODLE T5N-R63W-S19 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ODLE T5N-R63W-S19 L01**

Consent Decree Tank System Number: **1175**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,271</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,016</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>377</b>	<b>377</b>	
Total VCS Capacity (scfh)	<b>5,393</b>	<b>6,919</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,122</b>	<b>2,647</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/18/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ODLE T5N-R63W-S19 L01**

Consent Decree Tank System Number: **1175**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,271</b>	<b>4,271</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ODLE T5N-R63W-S19 L01**

Consent Decree Tank System Number: **1175**

**Audit Notes**

The final walkdown checklist is not marked as being complete.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01**

Consent Decree Tank System Number: **627**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_FINAL PACKET	.pdf	4/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/26/2017	STEM Engineering Evaluation Spreadsheet
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_FINAL PACKET	.pdf	4/29/2016	Work Request
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_WALKDOWN	.pdf	4/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_IR VERIFICATION	.pdf	12/19/2017	IR Verification Field Data Sheet
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_0918_NORMAL	.mp4	4/27/2016	IR Camera Video Normal Operations
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_0919_DUMP	.mp4	4/27/2016	IR Camera Video During Dump Event
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_0920_POST	.mp4	4/27/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01**

Consent Decree Tank System Number: **627**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>11,306</b>	<b>11,666</b>	<b>3%</b>
Calculated Burner Capacity (scfh)	<b>2,985</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>21,787</b>	<b>21,787</b>	
Total VCS Capacity (scfh)	<b>24,772</b>	<b>26,387</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,466</b>	<b>14,721</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/18/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01**

Consent Decree Tank System Number: **627**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	2,527	2,527
Total	11,666	11,306

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01**

Consent Decree Tank System Number: **627**

**Audit Notes**

The walkdown checklist (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_FINAL PACKET).

The signed eval (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_SIGNED EVAL) and the STEM model (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_STEM Engineering Evaluation\_rev1\_with TLO) indicate the correct VOC burner design was a LEED 48" Gen 1 #7. However according to the Installed Equipment worksheet (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_FINAL PACKET, p 35) a Tornado S/N 1159 Burner was installed on the site on 3/8/2016 and the LEED 48" S/N 11305 was removed from the site. These dates are included in the dates listed in the job sheet (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_FINAL PACKET, p 33) from 3/7/16 to 3/17/2016, however were not mentioned in the job sheet. A new model was run using the Tornado burner (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_STEM Engineering Eval\_rev2\_RA). Both models passed.

The STEM work request form (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_FINAL PACKET, p 3) first requests the flowlines for 15.1, and 33 be moved into the HLP separator #2 with well 23 and for the flowline from 69 to be moved to the old 33 HLP, Sep #3. According to the Separator identification from the field data sheet (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_FINAL PACKET, p 24), separators #2 & #3 both have 2" SMA valves. It was confirmed that the other 2 separators (1 & 4) were removed from the site according to the job sheet (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_FINAL PACKET, p 33). According to the walkdown checklist (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_WALKDOWN) A1, the trim sizes were updated to what is stated in the signed eval (1/2") (OREDIGGER WILMOTH MCCLINTOCK T4N-R64W-S4 L01\_SIGNED EVAL). A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

The site was selected for an additional IR Camera inspection because the original footage was very shaky.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ORR T6N-R65W-S19 L01**

Consent Decree Tank System Number: **1611**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
ORR T6N-R65W-S19 L01_FINAL PACKET	.pdf	1/14/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
ORR T6N-R65W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
ORR T6N-R65W-S19 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
ORR T6N-R65W-S19 L01_FINAL PACKET	.pdf	1/14/2016	Work Request
ORR T6N-R65W-S19 L01_FINAL PACKET	.pdf	1/14/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
ORR T6N-R65W-S19 L01_FINAL PACKET	.pdf	1/14/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
ORR T6N-R65W-S19 L01_IR VERIFICATION	.pdf	1/13/2016	IR Verification Field Data Sheet
ORR T6N-R65W-S19 L01_020_NORMAL	.mp4	1/13/2016	IR Camera Video Normal Operations
ORR T6N-R65W-S19 L01_021_DUMP	.mp4	1/13/2016	IR Camera Video During Dump Event
ORR T6N-R65W-S19 L01_022_POST	.mp4	1/13/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
ORR T6N-R65W-S19 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ORR T6N-R65W-S19 L01**

**Consent Decree Tank System Number:** **1611**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,451</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>6,256</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>6,256</b>	<b>10,386</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,985</b>	<b>5,935</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/4/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/20/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ORR T6N-R65W-S19 L01**

Consent Decree Tank System Number: **1611**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,451</b>	<b>4,271</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ORR T6N-R65W-S19 L01**

Consent Decree Tank System Number: **1611**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Job Sheet (Final Packet, pg 26) indicates a new LP separator with an unknown oil dump valve size and a 1/2" trim size was installed onsite. The Job Sheet confirms a 1/2" trim is installed on the oil dump valve.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve is installed on the LP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OSTER T4N-R64W-S19 L01**

Consent Decree Tank System Number: **1179**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
OSTER T4N-R64W-S19 L01_FINAL PACKET	.pdf	9/22/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R64W-S19 L01_STEM Engineering Evaluation_rev1	.xls	9/14/2017	STEM Engineering Evaluation Spreadsheet
OSTER T4N-R64W-S19 L01_Final Signed STEM Plan	.pdf	12/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R64W-S19 L01_FINAL PACKET	.pdf	9/22/2017	Work Request
OSTER T4N-R64W-S19 L01_FINAL PACKET	.pdf	9/22/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R64W-S19 L01_WALKDOWN	.pdf	4/3/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R64W-S19 L01_IR VERIFICATION	.pdf	3/31/2017	IR Verification Field Data Sheet
OSTER T4N-R64W-S19 L01_1918_NORMAL	.mp4	3/30/2017	IR Camera Video Normal Operations
OSTER T4N-R64W-S19 L01_1919_DUMP	.mp4	3/30/2017	IR Camera Video During Dump Event
OSTER T4N-R64W-S19 L01_1920_POST	.mp4	3/30/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R64W-S19 L01_SIGNED EVAL	.pdf	9/21/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OSTER T4N-R64W-S19 L01**

Consent Decree Tank System Number: **1179**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,204</b>	<b>2,204</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,812</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>94</b>	<b>94</b>	
Total VCS Capacity (scfh)	<b>2,906</b>	<b>5,927</b>	
VCS Capacity minus PPIVF (scfh)	<b>702</b>	<b>3,724</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess

Audit Document Review Date: 2/21/2018

Audit Document Review Verified by: Jesse Hanshaw

Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OSTER T4N-R64W-S19 L01**

Consent Decree Tank System Number: **1179**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.91							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	3.22							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	414							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	43.2							
Working Flow (Mscfd) <sup>h,i</sup>	4							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	1,802	1,802
Oil Tank Working Rate	164	164
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	2,204	2,204

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OSTER T4N-R64W-S19 L01**

Consent Decree Tank System Number: **1179**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

The work request (pg. 3 FINAL PACKET) states that a 4" AGL needed to be installed from the KO to Burner.

There is no verification that the work was completed.( pg. 11-31 FINAL PACKET)

**NOBLE RESPONSE:**

Field verification for this facility was completed on or around 2/22/2017, field verification confirmed that the 4" VOC line from the tank to KO was installed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Oster T4N-R65W-S27 L03**

Consent Decree Tank System Number: **154**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S27 L03_FINAL PACKET	.pdf	3/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S27 L03_STEM Engineering Evaluation_rev1	.xlsm	3/24/2017	STEM Engineering Evaluation Spreadsheet
OSTER T4N-R65W-S27 L03_Final Signed STEM Plan	.pdf	5/30/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S27 L03_FINAL PACKET	.pdf	3/20/2017	Work Request
OSTER T4N-R65W-S27 L03_FINAL PACKET	.pdf	3/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S27 L03_WALKDOWN	.pdf	3/20/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S27 L03_IR VERIFICATION	.pdf	3/17/2017	IR Verification Field Data Sheet
OSTER T4N-R65W-S27 L03_1859_NORMAL	.mp4	3/14/2017	IR Camera Video Normal Operations
OSTER T4N-R65W-S27 L03_1860_DUMP	.mp4	3/14/2017	IR Camera Video During Dump Event
OSTER T4N-R65W-S27 L03_1861_POST	.mp4	3/14/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S27 L03_Final Signed STEM Plan	.pdf	5/30/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** Oster T4N-R65W-S27 L03

**Consent Decree Tank System Number:** 154

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,204</b>	<b>2,325</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>2,812</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>66</b>	<b>66</b>	
Total VCS Capacity (scfh)	<b>2,878</b>	<b>5,899</b>	
VCS Capacity minus PPIVF (scfh)	<b>674</b>	<b>3,574</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker

Audit Document Review Date: 3/19/2018

Audit Document Review Verified by: Chris Driscoll

Audit Document Verification Date: 4/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Oster T4N-R65W-S27 L03**

Consent Decree Tank System Number: **154**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>440</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>45.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,913</b>	<b>1,802</b>
Oil Tank Working Rate	<b>174</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,325</b>	<b>2,204</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Oster T4N-R65W-S27 L03**

Consent Decree Tank System Number: **154**

**Audit Notes**

The walkdown checklist (OSTER T4N-R65W-S27 L03\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (OSTER T4N-R65W-S27 L03\_FINAL PACKET).

The Work Request Form says to replace the LP oil dump with 1" x 3/8". The Job Sheet (Final packet p23) says a Versa Valve was installed, but there was no confirmation that the valve was changed to 1". A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OSTER T4N-R65W-S28 L03**

Consent Decree Tank System Number: **1183**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S28 L03_FINAL PACKET	.pdf	8/8/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S28 L03_STEM Engineering Evaluation_rev1	.xlsm	8/18/2017	STEM Engineering Evaluation Spreadsheet
OSTER T4N-R65W-S28 L03_SIGNED EVAL	.pdf	8/21/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S28 L03_FINAL PACKET	.pdf	8/8/2017	Work Request
OSTER T4N-R65W-S28 L03_FINAL PACKET	.pdf	8/8/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S28 L03_WALKDOWN	.pdf	8/4/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S28 L03_IR VERIFICATION	.pdf	8/4/2017	IR Verification Field Data Sheet
OSTER T4N-R65W-S28 L03_2221_NORMAL	.mp4	8/4/2017	IR Camera Video Normal Operations
OSTER T4N-R65W-S28 L03_2222_DUMP	.mp4	8/4/2017	IR Camera Video During Dump Event
OSTER T4N-R65W-S28 L03_2223_POST	.mp4	8/4/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
OSTER T4N-R65W-S28 L03_SIGNED EVAL	.pdf	8/21/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** OSTER T4N-R65W-S28 L03

**Consent Decree Tank System Number:** 1183

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	TEC 4-CS (48" Tornado)			
Number of Units	1			
Man. Capacity (MSCFD)	110.4			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,068	3,069	0%
Calculated Burner Capacity (scfh)	3,769	4,600	
Headspace Surge Capacity (scfh)	0	0	
Total VCS Capacity (scfh)	3,769	4,600	
VCS Capacity minus PPIVF (scfh)	701	1,531	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/4/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/21/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OSTER T4N-R65W-S28 L03**

Consent Decree Tank System Number: **1183**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OSTER T4N-R65W-S28 L03**

Consent Decree Tank System Number: **1183**

**Audit Notes**

**HLP Separator Operating Pressure**

Field datasheet (Final Packet, pg 15) shows a HLP separator onsite, indicates the HP separator serial number is 36308 and the LP separator serial number is unreadable. This HLP separator is currently onsite today. The QC Stem Checkout form (Final Packet, pg 27) indicates the separator with serial number 36303 was set to a max operating pressure of 55 psi. Given this and that ITEM B3 of the STEM Walkdown Checklist (Final Packet, pg 29) is checked "yes", SLR is assuming 36303 is the serial number of the LP separator onsite, and therefore the QC Stem Checkout form confirms the 55 psi max separator pressure onsite.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OTTOSON T7N-R65W-S32 L01**

Consent Decree Tank System Number: **937**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
OTTOSON T7N-R65W-S32 L01_FINAL PACKET_REWORK	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
OTTOSON T7N-R65W-S32 L01_STEM Engineering Evaluation_rev1_REWORK	.xlsm	8/18/2017	STEM Engineering Evaluation Spreadsheet
OTTOSON T7N-R65W-S32 L01_SIGNED EVAL_REWORK	.pdf	8/22/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
OTTOSON T7N-R65W-S32 L01_FINAL PACKET_REWORK	.pdf	8/4/2017	Work Request
OTTOSON T7N-R65W-S32 L01_FINAL PACKET_REWORK	.pdf	8/4/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
OTTOSON T7N-R65W-S32 L01_WALKDOWN	.pdf	9/30/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
OTTOSON T7N-R65W-S32 L01_IR VERIFICATION	.pdf	9/29/2015	IR Verification Field Data Sheet
OTTOSON T7N-R65W-S32 L01_0285_NORMAL	.mp4	9/28/2015	IR Camera Video Normal Operations
OTTOSON T7N-R65W-S32 L01_0286_DUMP	.mp4	9/28/2015	IR Camera Video During Dump Event
OTTOSON T7N-R65W-S32 L01_0288_POST	.mp4	9/28/2015	IR Camera Video Post Dump Event
OTTOSON T7N-R65W-S32 L01_IR VERIFICATION_REWORK	.pdf	8/3/2017	IR Verification Field Data Sheet (rework)
OTTOSON T7N-R65W-S32 L01_2189_NORMAL_REWORK	.mp4	8/1/2017	IR Camera Video Normal Operations (rework)
OTTOSON T7N-R65W-S32 L01_2190_DUMP_REWORK	.mp4	8/1/2017	IR Camera Video During Dump Event (rework)
OTTOSON T7N-R65W-S32 L01_2191_POST_REWORK	.mp4	8/1/2017	IR Camera Video Post Dump Event (rework)

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
OTTOSON T7N-R65W-S32 L01_SIGNED EVAL_REWORK	.pdf	8/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OTTOSON T7N-R65W-S32 L01**

Consent Decree Tank System Number: **937**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,788</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>15,409</b>	<b>15,409</b>	
Total VCS Capacity (scfh)	<b>19,197</b>	<b>19,962</b>	
VCS Capacity minus PPIVF (scfh)	<b>15,516</b>	<b>16,137</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/4/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OTTOSON T7N-R65W-S32 L01**

Consent Decree Tank System Number: **937**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_r$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **OTTOSON T7N-R65W-S32 L01**

Consent Decree Tank System Number: **937**

**Audit Notes**

The walkdown checklist (OTTOSON T7N-R65W-S32 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (OTTOSON T7N-R65W-S32 L01\_FINAL PACKET\_REWORK).

The field datasheet (OTTOSON T7N-R65W-S32 L01\_FINAL PACKET\_REWORK, p14) does not list the diameter of the VOC line from the KO to the burners. The signed eval (OTTOSON T7N-R65W-S32 L01\_SIGNED EVAL\_REWORK) lists the diameter as 3". The data request from 12/10/2018 confirmed the VOC line from the KO to the burners is 3" in diameter.

According to the job sheet (OTTOSON T7N-R65W-S32 L01\_FINAL PACKET\_REWORK, p 20) a new 300# separator was added to the site. However there was no documentation of the valve or trim size. A1 from the walkdown checklist (OTTOSON T7N-R65W-S32 L01\_WALKDOWN) confirms a 1/2" trim was installed. A 2" valve was used in these calculations to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The walkdown was completed on 9/28/2015 prior to the rework work request (6/9/2017). The walkdown was only used to verify work requested in the original work request dated 7/30/2015.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** PAPPENHEIM DEJONG USX T7N-R64W-S13 L01

**Consent Decree Tank System Number:** 580

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_FINAL PACKET	.pdf	12/21/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_STEM Engineering Evaluation_rev1	.xlsm	12/21/2017	STEM Engineering Evaluation Spreadsheet
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_FINAL PACKET / PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_COMPLETED TLO	.pdf	12/21/2017	Work Request
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_FINAL PACKET / PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_COMPLETED TLO	.pdf	12/21/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_WALKDOWN	.pdf	9/23/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_IR VERIFICATION	.pdf	9/23/2015	IR Verification Field Data Sheet
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_0284_NORMAL	.mp4	9/21/2015	IR Camera Video Normal Operations
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_0285_DUMP	.mp4	9/21/2015	IR Camera Video During Dump Event
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_0286_POST	.mp4	9/21/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PAPPENHEIM DEJONG USX T7N-R64W-S13 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** PAPPENHEIM DEJONG USX T7N-R64W-S13 L01

**Consent Decree Tank System Number:** 580

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	6
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	7,986	7,987	0%
Calculated Burner Capacity (scfh)	2,446	5,833	
Headspace Surge Capacity (scfh)	26,402	26,402	
Total VCS Capacity (scfh)	28,848	32,235	
VCS Capacity minus PPIVF (scfh)	20,862	24,248	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 6/27/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/28/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PAPPENHEIM DEJONG USX T7N-R64W-S13 L01**

Consent Decree Tank System Number: **580**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>34</b>	<b>0</b>

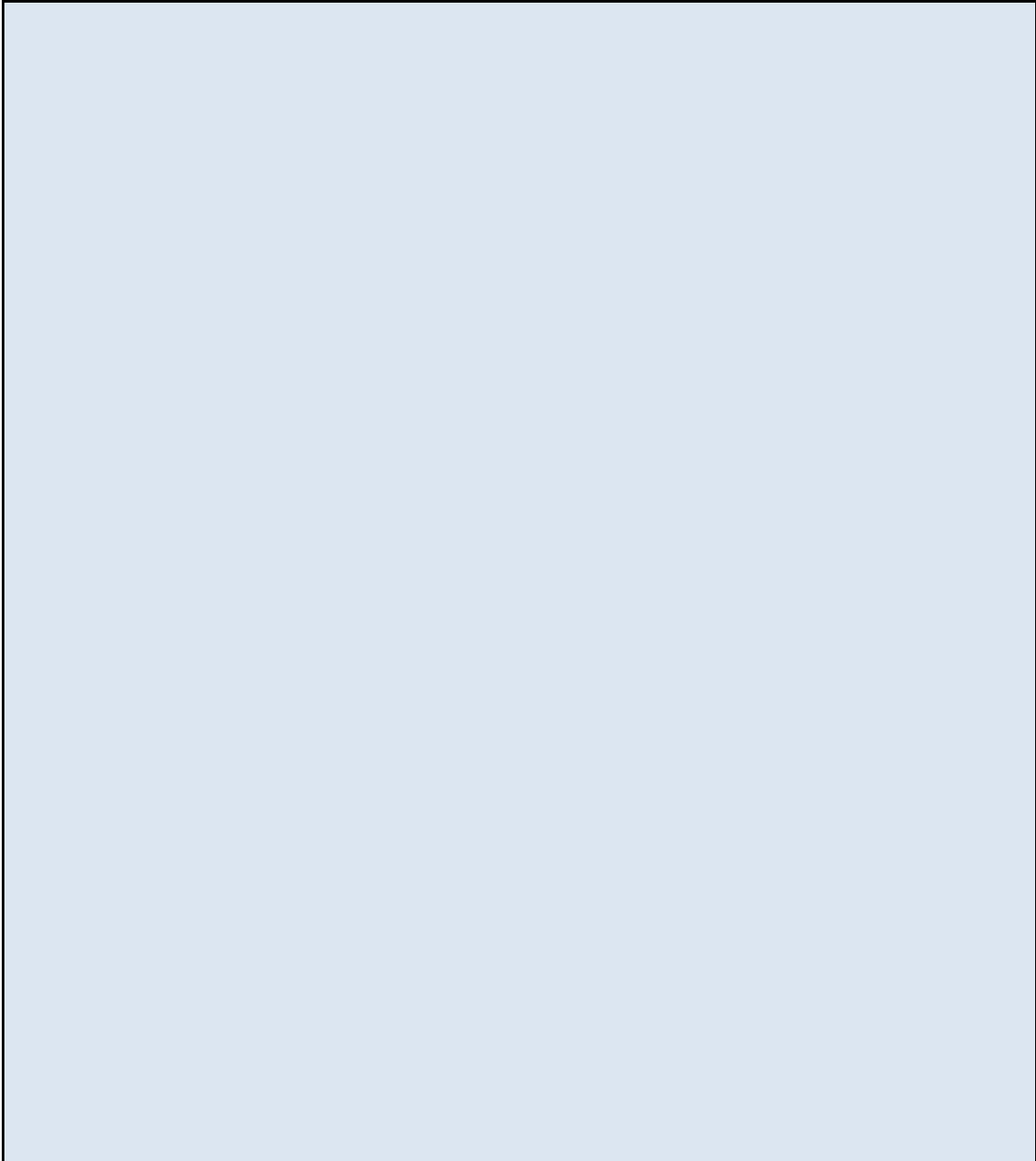
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,987</b>	<b>7,986</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PAPPENHEIM DEJONG USX T7N-R64W-S13 L01**

Consent Decree Tank System Number: **580**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is a light blue color.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PATRIOT T5N-R64W-S9 L01**

Consent Decree Tank System Number: **1953**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S9 L01_FINAL PACKET	.pdf	9/22/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S9 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/11/2017	STEM Engineering Evaluation Spreadsheet
PATRIOT T5N-R64W-S9 L01_SIGNED EVAL	.pdf	7/17/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S9 L01_FINAL PACKET	.pdf	9/22/2017	Work Request
PATRIOT T5N-R64W-S9 L01_FINAL PACKET	.pdf	9/22/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S9 L01_WALKDOWN	.pdf	4/25/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S9 L01_IR VERIFICATION	.pdf	4/21/2017	IR Verification Field Data Sheet
PATRIOT T5N-R64W-S9 L01_0869_Normal	.mp4	4/18/2016	IR Camera Video Normal Operations
PATRIOT T5N-R64W-S9 L01_0870_Dump	.mp4	4/18/2016	IR Camera Video During Dump Event
PATRIOT T5N-R64W-S9 L01_0871_Post	.mp4	4/18/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S9 L01_SIGNED EVAL	.pdf	7/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **PATRIOT T5N-R64W-S9 L01**

**Consent Decree Tank System Number:** **1953**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>130</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig) **N/A**

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 2</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>38,231</b>	<b>38,234</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,314</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>94,324</b>	<b>94,324</b>	
Total VCS Capacity (scfh)	<b>99,638</b>	<b>105,991</b>	
VCS Capacity minus PPIVF (scfh)	<b>61,407</b>	<b>67,757</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/19/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PATRIOT T5N-R64W-S9 L01**

Consent Decree Tank System Number: **1953**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.43</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.54</b>							
Gas/Oil Ratio (scf/bbl)	<b>232.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>593</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>143</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3448</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>801.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>33</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>23</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>33,390</b>	<b>33,390</b>
Oil Tank Working Rate	<b>1,366</b>	<b>1,363</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>38,234</b>	<b>38,231</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PATRIOT T5N-R64W-S9 L01**

Consent Decree Tank System Number: **1953**

**Audit Notes**

The Walkdown Checklist (PATRIOT T5N-R64W-S9 L01\_FINAL PACKET.pdf, pg. 22) did not indicate if all items on the Work Request (PATRIOT T5N-R64W-S9 L01\_FINAL PACKET.pdf, pg. 3) were completed. The site equipment list was verified through other supplied documentation.

The Final Signed Engineering Evaluation (PATRIOT T5N-R64W-S9 L01\_SIGNED EVAL.pdf, pg. 2) indicates the oil tank battery is not banked. However, the Final Facility Walkdown Checklist (PATRIOT T5N-R642-S9 L01\_WALKDOWN.pdf, pg. 5) states the oil tanks are banked in the following configuration, "One bank of 1 oil and one bank of 3 oil". Data request from 2/20/2018 confirmed there is no banking at the site.

This site was selected for an additional IR Camera inspection because there are no clear shots of the thief hatches.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PATRIOT T5N-R64W-S16 L01**

Consent Decree Tank System Number: **1503/306**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_FINAL PACKET	.pdf	7/20/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_STEM Engineering Evaluation_rev1	.xlsm	9/29/2017	STEM Engineering Evaluation Spreadsheet
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_SIGNED EVAL	.pdf	9/29/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_FINAL PACKET	.pdf	7/20/2015	Work Request
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_FINAL PACKET	.pdf	7/20/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_WALKDOWN	.pdf	7/16/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_IR VERIFICATION	.pdf	7/17/2015	IR Verification Field Data Sheet
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_0172_NORMAL	.mp4	7/17/2015	IR Camera Video Normal Operations
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_0173_DUMP	.mp4	7/17/2015	IR Camera Video During Dump Event
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_0174_POST	.mp4	7/17/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PATRIOT T5N-R64W-S16 L04 & PATRIOT T5N-R64W-S16 L01_SIGNED EVAL	.pdf	9/29/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PATRIOT T5N-R64W-S16 L01**

Consent Decree Tank System Number: **1503/306**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>	<b>140</b>	<b>140</b>					
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>	<b>1" &amp; 3/8"</b>	<b>1" &amp; 3/8"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>2</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>157</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>22,142</b>	<b>22,144</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>10,625</b>	<b>17,683</b>	
Headspace Surge Capacity (scfh)	<b>21,038</b>	<b>21,038</b>	
Total VCS Capacity (scfh)	<b>31,663</b>	<b>38,721</b>	
VCS Capacity minus PPIVF (scfh)	<b>9,521</b>	<b>16,577</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/4/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/21/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PATRIOT T5N-R64W-S16 L01**

Consent Decree Tank System Number: **1503/306**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50	1.50	1.50					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	1.61	1.61	1.61					
Gas/Oil Ratio (scf/bbl)	256.2	256.2	256.2					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.91	0.91	0.91					
Valve Coefficient (gpm/psi) ( $C_v$ )	3.22	3.22	3.22					
Critical Pressure (psia) <sup>b</sup>	601	601	601					
Vapor Pressure (psia) <sup>c</sup>	153	153	153					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.82	0.82	0.82					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	645	645	645					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	165.3	165.3	165.3					
Working Flow (Mscfd) <sup>h,i</sup>	6	6	6					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	20,664	20,664
Oil Tank Working Rate	767	765
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>22,144</b>	<b>22,142</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PATRIOT T5N-R64W-S16 L01**

Consent Decree Tank System Number: **1503/306**

**Audit Notes**

**Oil Dump Valve Size**

Field Datasheet (Final Packet, pg 9 & 21) shows the separators onsite originally had 1" oil dump valves with various trim sizes. The STEM Work Request form (Final Packet, pg 5) requests all oil dump valve trim sizes be replaced with 3/8" trims. The Jobsheet (Final Packet, pg 32) notes the trims were changed out to 3/8", but just to the right of this note there appears to be another note which appears to say "not yet". This note possibly means the valve trims were not yet changed to 3/8" at the time this jobsheet was created. However ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 29) is checked "yes", indicating the oil dump is consistent with the Engineering Evaluation and are therefore 3/8" trims.

All oil dumps valve sizes were previously 1". These oil dump valve sizes have not been modified and therefore 1" oil dump valves are installed on the separators currently.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEDRO ST T4N-R65W-S36 L01**

Consent Decree Tank System Number: **682**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L01_FINAL PACKET	.pdf	9/29/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	8/15/2016	STEM Engineering Evaluation Spreadsheet
PEDRO ST T4N-R65W-S36 L01_SIGNED EVAL	.pdf	8/15/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L01_FINAL PACKET	.pdf	9/29/2017	Work Request
PEDRO ST T4N-R65W-S36 L01_FINAL PACKET	.pdf	9/29/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L01_WALKDOWN	.pdf	8/4/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L01_IR VERIFICATION	.pdf	8/4/2016	IR Verification Field Data Sheet
PEDRO ST T4N-R65W-S36 L01_1364_NORMAL	.mp4	8/4/2016	IR Camera Video Normal Operations
PEDRO ST T4N-R65W-S36 L01_1365_DUMP	.mp4	8/4/2016	IR Camera Video During Dump Event
PEDRO ST T4N-R65W-S36 L01_1366_POST	.mp4	8/4/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L01_SIGNED EVAL	.pdf	8/15/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **PEDRO ST T4N-R65W-S36 L01**

**Consent Decree Tank System Number:** **682**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,216</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>25,275</b>	<b>25,275</b>	
Total VCS Capacity (scfh)	<b>28,491</b>	<b>29,875</b>	
VCS Capacity minus PPIVF (scfh)	<b>23,507</b>	<b>24,890</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 11/16/2017  
 Audit Document Review Verified by: Kenny Malmquist  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEDRO ST T4N-R65W-S36 L01**

Consent Decree Tank System Number: **682**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEDRO ST T4N-R65W-S36 L01**

Consent Decree Tank System Number: **682**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 12-17) are not dated. Assumed the date is the same as Facility Scouting date (4/12/16).

**2. Oil Tank not converted to Vapor Space Tank onsite - Engineering Design Standard not followed**

The STEM Work Request (Final Packet pg 3) requests a tank to be disconnected from the fill header and to be emptied and used as a vapor surge vessel. Check C13 of the STEM Walkdown Checklist (Final Packet pg 7) indicates the LP separator(s) are configured to produce into all tanks and the Job Sheet (Final Packet pg 26) does not indicate an oil tank was emptied and put into vapor service. The documentation indicates an oil tank was never put into vapor service and therefore the Engineering Design Standard was not followed.

**5/14/2018 UPDATE** - Noble provided SLR information noting field verification for this facility was completed on or around 2/26/2018, and confirmed one oil tank was converted into a headspace tank. Therefore the Engineering Design Standard is being followed.

**3. Five oil tanks originally onsite, Job Sheet indicates one oil tank was removed twice**

STEM Work Request (Final Packet pg 3) requests a oil tank be disconnected and removed from service. The Job Sheet (Final Packet pg 26) indicates twice that production tank (SN: 12-1977) was removed. Assume the Foreman who filled out the Job Sheet accidentally wrote the same info twice.

**4. Number of VOC lines from Tanks to KO not consistent in documentation - Engineering Design Standard not followed**

Aerial Photo (Final Packet pg 9) shows two separate VOC lines from Tanks to KO. STEM Work Request (Final Packet pg 3) requests the VOC header on the top of the tanks be modified so there is a single line down to the KO pot. The Job Sheet (Final Packet pg 26) nor any other documentation shows a single line from tanks to KO was ever installed onsite, therefore the Engineering Design Standard was not followed.

**5. Unable to determine KO to burner VOC line size - Request additional data from Noble**

Field Data Sheets (Final Packet pg 16) show that a 2" below ground VOC line (BGL) from KO to burners existed previously onsite. The STEM Work Request (Final Packet pg 3) indicates a 4" above ground VOC line (AGL) was requested to be connected to the burner onsite. The only documentation provided which may indicate the 4" AGL line was installed is the Cost Estimate (Final Packet pg 8) which indicates a 3" or 4" AGL was priced out and check A7 on the STEM Walkdown Checklist (Final Packet pg 5) indicates piping support has been installed hinting that a VOC AGL was installed onsite. The Job Sheet and other provided documentation does not indicate the VOC BGL was ever abandoned onsite. Given the above information it cannot be determined if a 4" KO to burners VOC line is onsite.

**Request data from Noble to show a 4" KO to VOC line is currently onsite**

**5/14/2018 UPDATE** - Noble provided SLR information noting field verification for this facility was completed on or around 6/21/2016, and confirmed the above ground 4" vapor line was installed onsite.

**6. Number of LP Separators documented onsite**

The STEM Work Request (Final Packet pg 3) indicates a request was made for the existing G36-18 (SN: 8476) separator to be converted to the LP Separator. The Job Sheet (Final Packet pg 26) does not confirm the G36-18 HP separator was ever converted to an LP separator. The QC Stem Checkout (Final Packet pg 24) shows there is only one separator onsite (SN: 8476) and it is operating at the correct pressure. Therefore the QC STEM Checkout confirms one LP separator onsite which dumps to the oil tanks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEDRO ST T4N-R65W-S36 L03**

Consent Decree Tank System Number: **1928**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L03_FINAL PACKET	.pdf	6/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L03_STEM Engineering Evaluation_rev1	.xlsm	7/11/2017	STEM Engineering Evaluation Spreadsheet
PEDRO ST T4N-R65W-S36 L03_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L03_FINAL PACKET	.pdf	6/16/2016	Work Request
PEDRO ST T4N-R65W-S36 L03_FINAL PACKET	.pdf	6/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L03_WALKDOWN	.pdf	6/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L03_IR VERIFICATION	.pdf	6/7/2016	IR Verification Field Data Sheet
PEDRO ST T4N-R65W-S36 L03_1108_NORMAL	.mp4	6/7/2016	IR Camera Video Normal Operations
PEDRO ST T4N-R65W-S36 L03_1109_DUMP	.mp4	6/7/2016	IR Camera Video During Dump Event
PEDRO ST T4N-R65W-S36 L03_1110_POST	.mp4	6/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PEDRO ST T4N-R65W-S36 L03_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **PEDRO ST T4N-R65W-S36 L03**

**Consent Decree Tank System Number:** **1928**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,035</b>	<b>7,215</b>	<b>3%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>20,814</b>	<b>21,840</b>	
Total VCS Capacity (scfh)	<b>24,812</b>	<b>26,798</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,777</b>	<b>19,583</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 6/6/2018  
 Audit Document Review Verified by: \_\_\_\_\_ K. Malmquist  
 Audit Document Verification Date: \_\_\_\_\_ 1/4/2019





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEDRO ST T4N-R65W-S36 L03**

Consent Decree Tank System Number: **1928**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,215</b>	<b>7,035</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEDRO ST T4N-R65W-S36 L03**

Consent Decree Tank System Number: **1928**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 13-18) are not dated. Date assumed to be same as Facility Scouting Date (2/26/2016).

**2. Vapor Surge Vessel - Request additional information**

The Engineering Evaluation indicates (1) vapor surge vessel is currently onsite. In the Noble provided data, no documentation is present to indicate a vapor surge vessel was onsite previously or that an oil tank onsite was converted to a vapor surge vessel at any point.

**Confirm an oil tank was converted to a vapor surge vessel onsite.**

**NOBLE UPDATE: The Tank Truck Loadout Final Packet (provided in this 6th Information Request Response titled 239\_PEDRO ST T4N-R65W-S36 L03 TLO Final Packet) dated 2/7/2017, provides confirmation that one tank was converted into a headspace tank.**

**3. Oil Dump Valve Size - Unknown**

Field Datasheet (Final Packet, pg 16) shows the LP separator onsite originally had a 2" oil dump valve with unknown trim size. ITEM A1 of the STEM Walkdown Checklist is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation, and is therefore 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the LP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the modeling guideline cannot be confirmed as being followed. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEPERZAK T6N-R64W-S12 L01**

Consent Decree Tank System Number: **1671**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PEPERZAK T6N-R64W-S12 L01_FINAL PACKET	.pdf	9/22/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PEPERZAK T6N-R64W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	3/14/2017	STEM Engineering Evaluation Spreadsheet
PEPERZAK T6N-R64W-S12 L01_SIGNED EVAL	.pdf	3/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PEPERZAK T6N-R64W-S12 L01_FINAL PACKET	.pdf	9/22/2017	Work Request
PEPERZAK T6N-R64W-S12 L01_FINAL PACKET	.pdf	9/22/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PEPERZAK T6N-R64W-S12 L01_WALKDOWN	.pdf	2/27/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PEPERZAK T6N-R64W-S12 L01_IR VERIFICATION	.pdf	2/27/2017	IR Verification Field Data Sheet
PEPERZAK T6N-R64W-S12 L01_0121_NORMAL	.mp4	2/24/2017	IR Camera Video Normal Operations
PEPERZAK T6N-R64W-S12 L01_0122_DUMP	.mp4	2/24/2017	IR Camera Video During Dump Event
PEPERZAK T6N-R64W-S12 L01_0123_POST	.mp4	2/24/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PEPERZAK T6N-R64W-S12 L01_SIGNED EVAL	.pdf	3/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEPERZAK T6N-R64W-S12 L01**

Consent Decree Tank System Number: **1671**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,315</b>	<b>3,433</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,926</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>16,105</b>	<b>16,105</b>	
Total VCS Capacity (scfh)	<b>20,031</b>	<b>21,938</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,716</b>	<b>18,506</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ 11/16/2017  
 Audit Document Review Date: \_\_\_\_\_ Davis Neepser  
 Audit Document Review Verified by: \_\_\_\_\_ Angela M. Oberlander  
 Audit Document Verification Date: \_\_\_\_\_ 10/11/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEPERZAK T6N-R64W-S12 L01**

Consent Decree Tank System Number: **1671**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,670</b>	<b>2,566</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,433</b>	<b>3,315</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PEPERZAK T6N-R64W-S12 L01**

Consent Decree Tank System Number: **1671**

### Audit Notes

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

Additional information is requested to determine if a tank was converted to vapor headspace service and the Engineering Design Standard was properly applied.

NEI Data Request Response:

Field verification for this facility was completed on or around 2/10/17, field verification confirmed that one tank was disconnected from the fill header in order to be used as headspace.

The Work Request indicated the oil dump valve on the HPLP Separator was to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PERKINS USX T2N-R64W-S5 L01**

Consent Decree Tank System Number: **1363**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
PERKINS USX T2N-R64W-S5 L01_FINAL PACKET	.pdf	5/10/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
PERKINS USX T2N-R64W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	5/12/2017	STEM Engineering Evaluation Spreadsheet
PERKINS USX T2N-R64W-S5 L01_SIGNED EVAL	.pdf	5/19/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
PERKINS USX T2N-R64W-S5 L01_FINAL PACKET	.pdf	5/10/2017	Work Request
PERKINS USX T2N-R64W-S5 L01_FINAL PACKET	.pdf	5/10/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
PERKINS USX T2N-R64W-S5 L01_WALKDOWN	.pdf	5/10/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
PERKINS USX T2N-R64W-S5 L01_IR VERIFICATION	.pdf	5/8/2017	IR Verification Field Data Sheet
PERKINS USX T2N-R64W-S5 L01_2009_NORMAL	.mp4	5/4/2017	IR Camera Video Normal Operations
PERKINS USX T2N-R64W-S5 L01_2011_DUMP	.mp4	5/4/2017	IR Camera Video During Dump Event
PERKINS USX T2N-R64W-S5 L01_2012_POST	.mp4	5/4/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
PERKINS USX T2N-R64W-S5 L01_SIGNED EVAL	.pdf	5/19/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PERKINS USX T2N-R64W-S5 L01**

Consent Decree Tank System Number: **1363**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,204</b>	<b>2,204</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,812</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>19</b>	<b>19</b>	
Total VCS Capacity (scfh)	<b>2,831</b>	<b>5,852</b>	
VCS Capacity minus PPIVF (scfh)	<b>627</b>	<b>3,649</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 11/16/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 11/20/2017





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PERKINS USX T2N-R64W-S5 L01**

Consent Decree Tank System Number: **1363**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.91</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>414</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>43.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,802</b>	<b>1,802</b>
Oil Tank Working Rate	<b>164</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>2,204</b>	<b>2,204</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PERKINS USX T2N-R64W-S5 L01**

Consent Decree Tank System Number: **1363**

**Audit Notes**

The walkdown checklist (PERKINS USX T2N-R64W-S5 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (PERKINS USX T2N-R64W-S5 L01\_FINAL PACKET).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PETERSON T8N-R59W-S19 L01**

Consent Decree Tank System Number: **1919**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PETERSON T8N-R59W-S19 L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PETERSON T8N-R59W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	8/21/2017	STEM Engineering Evaluation Spreadsheet
PETERSON T8N-R59W-S19 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PETERSON T8N-R59W-S19 L01_FINAL PACKET	.pdf	8/4/2017	Work Request
PETERSON T8N-R59W-S19 L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PETERSON T8N-R59W-S19 L01_FINAL PACKET	.pdf	8/4/2017	Final Facility Walkdown Checklist
174_PETERSON T8N-R59W-S19 L01 Automation	.msg	8/18/2017	Automation Confirmation of Tank Level Control

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PETERSON T8N-R59W-S19 L01_IR VERIFICATION	.pdf	3/22/2018	IR Verification Field Data Sheet
PETERSON T8N-R59W-S19 L01_2218_NORMAL	.mp4	8/3/2017	IR Camera Video Normal Operations
PETERSON T8N-R59W-S19 L01_2219_DUMP	.mp4	8/3/2017	IR Camera Video During Dump Event
PETERSON T8N-R59W-S19 L01_2220_POST	.mp4	8/3/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PETERSON T8N-R59W-S19 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **PETERSON T8N-R59W-S19 L01**

**Consent Decree Tank System Number:** **1919**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>145</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; a*</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>145</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; a*</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>197,665</b>	<b>195,092</b>	<b>-1%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>446,632</b>	<b>446,632</b>	
Total VCS Capacity (scfh)	<b>450,003</b>	<b>451,590</b>	
VCS Capacity minus PPIVF (scfh)	<b>252,338</b>	<b>256,499</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 8/15/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PETERSON T8N-R59W-S19 L01**

Consent Decree Tank System Number: **1919**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.53</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.65</b>							
Gas/Oil Ratio (scf/bbl)	<b>268.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>93.30</b>							
Critical Pressure (psia) <sup>b</sup>	<b>606</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>158</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>15737</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>4224.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>150</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>93.30</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>30022</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>120</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>169</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>500</b>
scfh vapor/tank <sup>i</sup>	<b>396</b>	<b>396</b>
Mscfd	<b>10</b>	<b>10</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>176,036</b>	<b>178,384</b>
Oil Tank Working Rate	<b>6,236</b>	<b>6,303</b>
Water Tank Flash Rate	<b>5,004</b>	<b>5,070</b>
Water Tank Working Rate	<b>7,023</b>	<b>7,116</b>
Tank Breathing Rate	<b>792</b>	<b>792</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>195,092</b>	<b>197,665</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PETERSON T8N-R59W-S19 L01**

Consent Decree Tank System Number: **1919**

### Audit Notes

There is no confirmation in the documents that the Tank Level Automation for the tanks was installed and set to shut in wellheads when the tanks are 50% full as stated in the STEM Work Request Form. Received e-mail confirmation via data request that the Tank Level Automation was installed and set to shut in wellheads when the tanks are 50% full

It appears that the Cv or Cf used in SLR's calculations are slightly different than those used by Noble for the working and flash emissions. This causes a slight difference (-1%) in the calculated PPIVF results. It appears that Noble over estimated the emissions so the modeling guideline is still being followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PETTINGER USX T7N-R64W-S35 L01**

Consent Decree Tank System Number: **1491**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PETTINGER USX T7N-R64W-S35 L01_FINAL PACKET_REWORK	.pdf	2/28/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PETTINGER USX T7N-R64W-S35 L01_STEM Engineering Evaluation_rev1	.xlsm	2/27/2018	STEM Engineering Evaluation Spreadsheet
PETTINGER USX T7N-R64W-S35 L01_SIGNED EVAL_REWORK	.pdf	2/27/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PETTINGER USX T7N-R64W-S35 L01_FINAL PACKET_REWORK	.pdf	2/28/2017	Work Request
PETTINGER USX T7N-R64W-S35 L01_FINAL PACKET_REWORK	.pdf	2/28/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PETTINGER USX T7N-R64W-S35 L01_WALKDOWN_REWORK	.pdf	2/23/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PETTINGER USX T7N-R64W-S35 L01_IR VERIFICATION_REWORK	.pdf	2/23/2017	IR Verification Field Data Sheet
PETTINGER USX T7N-R64W-S35 L01_0116_NORMAL_REWORK	.mp4	2/23/2017	IR Camera Video Normal Operations
PETTINGER USX T7N-R64W-S35 L01_0117_DUMP_REWORK	.mp4	2/23/2017	IR Camera Video During Dump Event
PETTINGER USX T7N-R64W-S35 L01_0118_POST_REWORK	.mp4	2/23/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PETTINGER USX T7N-R64W-S35 L01_SIGNED EVAL_REWORK	.pdf	2/27/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **PETTINGER USX T7N-R64W-S35 L01**

**Consent Decree Tank System Number:** **1491**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>7,048</b>	<b>9,558</b>	
Headspace Surge Capacity (scfh)	<b>569</b>	<b>569</b>	
Total VCS Capacity (scfh)	<b>7,617</b>	<b>10,127</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,936</b>	<b>6,302</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/6/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/21/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PETTINGER USX T7N-R64W-S35 L01**

Consent Decree Tank System Number: **1491**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PETTINGER USX T7N-R64W-S35 L01**

Consent Decree Tank System Number: **1491**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

The Jobsheet (Final Packet, pg 20) confirms a new LP separator was installed onsite and that a 1/2" oil dump trim is installed on the separator.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this 1" valve was/is installed on the LP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01**

Consent Decree Tank System Number: **489**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_FINAL PACKET	.pdf	3/8/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_SIGNED EVAL	.pdf	3/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_FINAL PACKET	.pdf	3/8/2018	Work Request
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_FINAL PACKET	.pdf	3/8/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_WALKDOWN	.pdf	3/12/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_IR VERIFICATION	.pdf	3/12/2018	IR Verification Field Data Sheet
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_0105_NORMAL	.mp4	3/12/2018	IR Camera Video Normal Operations
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_0106_DUMP	.mp4	3/12/2018	IR Camera Video During Dump Event
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_0107_POST	.mp4	3/12/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01_SIGNED EVAL	.pdf	3/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01**

**Consent Decree Tank System Number:** **489**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>268</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,458</b>	<b>4,638</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>15,579</b>	<b>15,579</b>	
Total VCS Capacity (scfh)	<b>18,304</b>	<b>21,412</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,846</b>	<b>16,774</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/6/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01**

Consent Decree Tank System Number: **489**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>268</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>212</b>	<b>0</b>
Mscfd	<b>10</b>	<b>0</b>

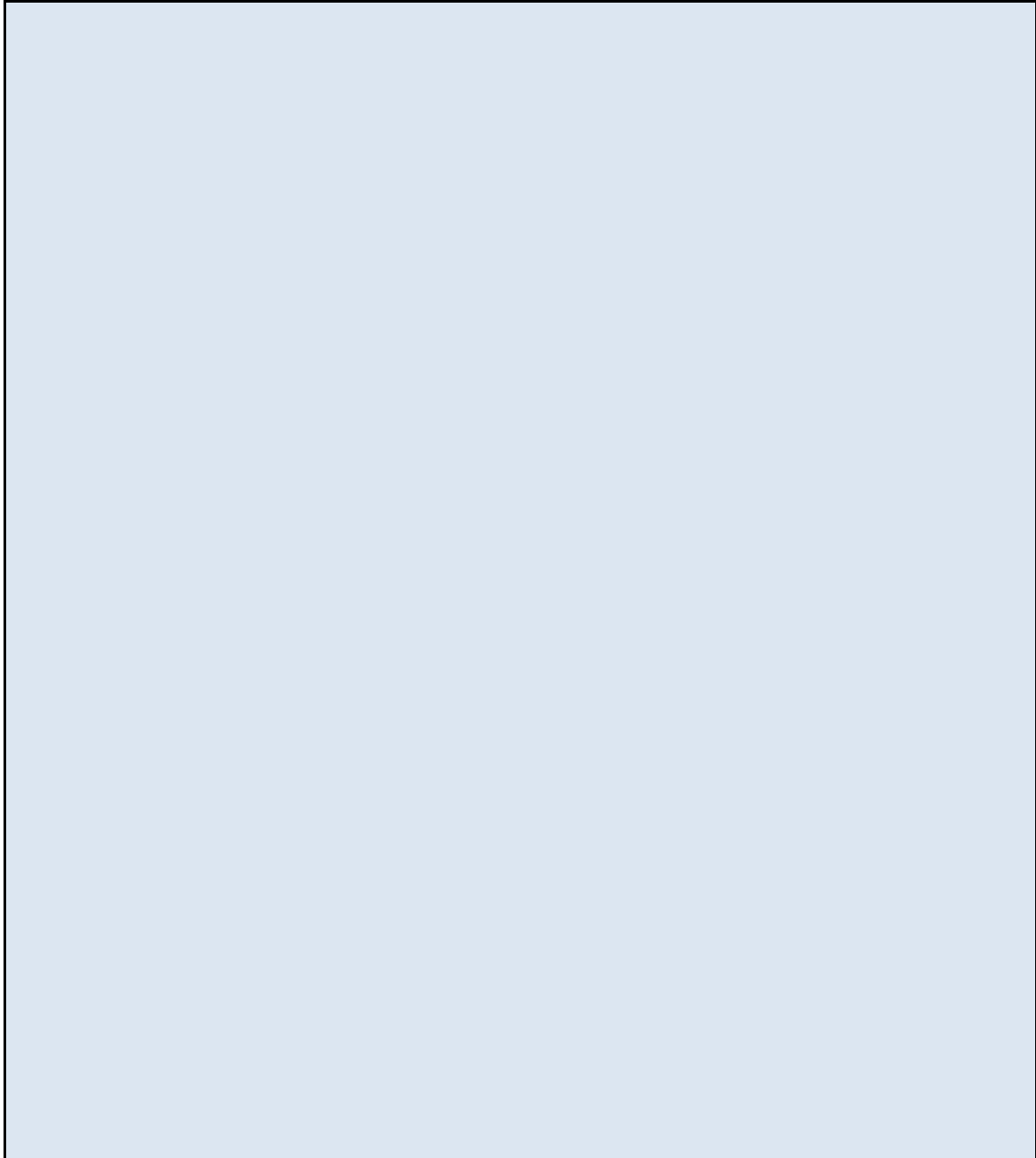
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>425</b>	<b>425</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,638</b>	<b>4,458</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **POLLOCK HADDIX LANE ALOYSIUS T4N-R64W-S34 L01**

Consent Decree Tank System Number: **489**

**Audit Notes**

A large, empty rectangular box with a thin black border, intended for entering audit notes. The interior of the box is a light blue color.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PTASNIK FED T9N-R59W-S33 L01**

Consent Decree Tank System Number: **1985**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PTASNIK FED T9N-R59W-S33 L01_FINAL PACKET	.pdf	10/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK FED T9N-R59W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	6/15/2017	STEM Engineering Evaluation Spreadsheet
PTASNIK FED T9N-R59W-S33 L01_SIGNED EVAL (1)	.pdf	6/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK FED T9N-R59W-S33 L01_FINAL PACKET	.pdf	10/30/2015	Work Request
PTASNIK FED T9N-R59W-S33 L01_FINAL PACKET	.pdf	10/30/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK FED T9N-R59W-S33 L01_WALKDOWN	.pdf	10/30/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK FED T9N-R59W-S33 L01_IR VERIFICATION	.pdf	10/28/2015	IR Verification Field Data Sheet
PTASNIK FED T9N-R59W-S33 L01_0389_NORMAL	.mp4	10/27/2015	IR Camera Video Normal Operations
PTASNIK FED T9N-R59W-S33 L01_0390_DUMP	.mp4	10/27/2015	IR Camera Video During Dump Event
PTASNIK FED T9N-R59W-S33 L01_0391_POST	.mp4	10/27/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK FED T9N-R59W-S33 L01_SIGNED EVAL (1)	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PTASNIK FED T9N-R59W-S33 L01**

Consent Decree Tank System Number: **1985**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>250</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>157</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,847</b>	<b>12,849</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,606</b>	<b>11,095</b>	
Headspace Surge Capacity (scfh)	<b>10,813</b>	<b>10,813</b>	
Total VCS Capacity (scfh)	<b>18,419</b>	<b>21,908</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,572</b>	<b>9,059</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 11/16/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PTASNIK FED T9N-R59W-S33 L01**

Consent Decree Tank System Number: **1985**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	21.25							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2213							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	213.2							
Working Flow (Mscfd) <sup>h,i</sup>	21							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78	0.78						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20	7.20						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	1629	3114						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	7	12						
Working Flow (Mscfd) <sup>l</sup>	9	17						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>i</sup>	396	396
Mscfd	19	10

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	8,883	8,883
Oil Tank Working Rate	877	875
Water Tank Flash Rate	791	790
Water Tank Working Rate	1,110	1,110
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
<b>Total</b>	<b>12,849</b>	<b>12,847</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: PTASNIK FED T9N-R59W-S33 L01

Consent Decree Tank System Number: 1985

**Audit Notes**

The Work Request indicated the oil and water dump valve trims were to be confirmed as 1-inch trim and 1/2-inch trims, respectively. The Job Sheet confirmed orifice plates of the corresponding trim size were installed on the dump valves. The oil and water dump valve size on the heater treater is unknown with the documentation provided. Conservatively assumed the valve to be 2", which corresponds with the separator oil dump valve.

NEI Data Request Response:

The specific valve size/type is not a critical aspect of the design. Field verification of the valve size would not impact the adequacy of design determination, as the typical design targets 20-30% contingency.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PTASNIK T9N-R59W-S29 L01**

Consent Decree Tank System Number: **2008**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
PTASNIK T9N-R59W-S29 L01	.pdf	9/13/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK T9N-R59W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
PTASNIK T9N-R59W-S29 L01_SIGNED EVAL	.pdf	10/9/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK T9N-R59W-S29 L01	.pdf	9/13/2017	Work Request
PTASNIK T9N-R59W-S29 L01	.pdf	9/13/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK T9N-R59W-S29 L01_WALKDOWN	.pdf	9/11/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK T9N-R59W-S29 L01_IR VERIFICATION	.pdf	9/11/2017	IR Verification Field Data Sheet
PTASNIK T9N-R59W-S29 L01_4736_NORMAL	.mp4	9/11/2017	IR Camera Video Normal Operations
PTASNIK T9N-R59W-S29 L01_4738_DUMP	.mp4	9/11/2017	IR Camera Video During Dump Event
PTASNIK T9N-R59W-S29 L01_4739_POST	.mp4	9/11/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
PTASNIK T9N-R59W-S29 L01_SIGNED EVAL	.pdf	10/9/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PTASNIK T9N-R59W-S29 L01**

Consent Decree Tank System Number: **2008**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>400</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>20,288</b>	<b>20,291</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,716</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>94,124</b>	<b>94,124</b>	
Total VCS Capacity (scfh)	<b>97,840</b>	<b>98,677</b>	
VCS Capacity minus PPIVF (scfh)	<b>77,552</b>	<b>78,386</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:  
 Audit Document Review Date:  
 Audit Document Review Verified by:  
 Audit Document Verification Date:

Brian Cherwien  
 \_\_\_\_\_  
 7/24/2018  
 \_\_\_\_\_  
 Angela M. Oberlander  
 \_\_\_\_\_  
 9/6/2018  
 \_\_\_\_\_



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PTASNIK T9N-R59W-S29 L01**

Consent Decree Tank System Number: **2008**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	5068	11381						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	20	46						
Working Flow (Mscfd) <sup>l</sup>	28	64						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	29	6

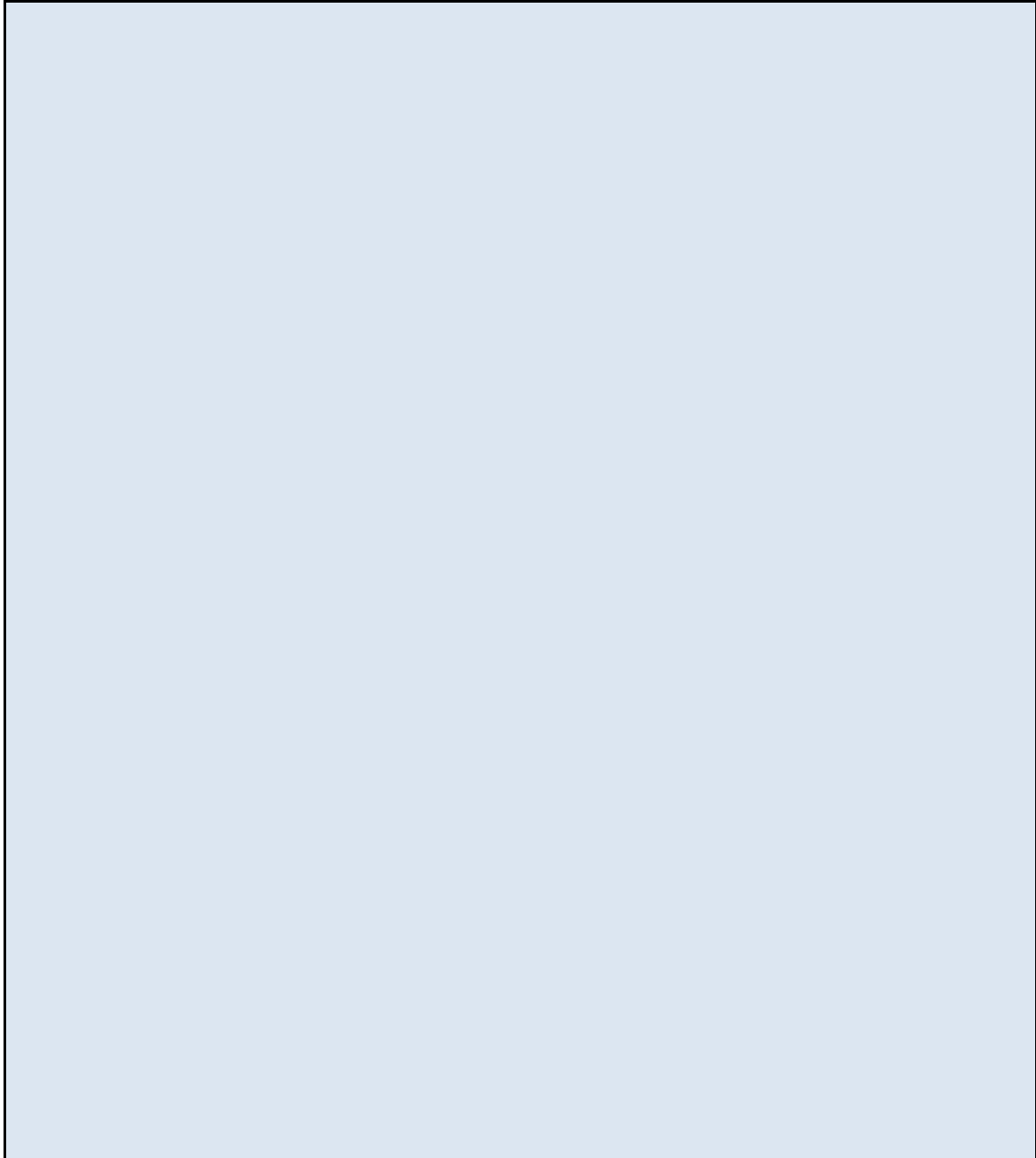
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	2,741	2,741
Water Tank Working Rate	3,848	3,848
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	0	0
Total	20,291	20,288

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **PTASNIK T9N-R59W-S29 L01**

Consent Decree Tank System Number: **2008**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAGAN ROACH T5N-R67W-S1 L01**

Consent Decree Tank System Number: **21**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RAGAN ROACH T5N-R67W-S1 L01_FINAL PACKET	.pdf	12/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RAGAN ROACH T5N-R67W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	9/15/2016	STEM Engineering Evaluation Spreadsheet
RAGAN ROACH T5N-R67W-S1 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RAGAN ROACH T5N-R67W-S1 L01_FINAL PACKET	.pdf	12/20/2017	Work Request
RAGAN ROACH T5N-R67W-S1 L01_FINAL PACKET	.pdf	12/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RAGAN ROACH T5N-R67W-S1 L01_WALKDOWN	.pdf	9/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RAGAN ROACH T5N-R67W-S1 L01_IR VERIFICATION	.pdf	9/8/2016	IR Verification Field Data Sheet
RAGAN ROACH T5N-R67W-S1 L01_1480_NORMAL	.mp4	9/8/2016	IR Camera Video Normal Operations
RAGAN ROACH T5N-R67W-S1 L01_1481_DUMP	.mp4	9/8/2016	IR Camera Video During Dump Event
RAGAN ROACH T5N-R67W-S1 L01_1482_POST	.mp4	9/8/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RAGAN ROACH T5N-R67W-S1 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAGAN ROACH T5N-R67W-S1 L01**

Consent Decree Tank System Number: **21**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>33,205</b>	<b>33,212</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>135,833</b>	<b>135,833</b>	
Total VCS Capacity (scfh)	<b>139,888</b>	<b>140,433</b>	
VCS Capacity minus PPIVF (scfh)	<b>106,683</b>	<b>107,221</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 12/20/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 2/6/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAGAN ROACH T5N-R67W-S1 L01**

Consent Decree Tank System Number: **21**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.76</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>57.00</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>6378</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>719.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>61</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>29,971</b>	<b>29,971</b>
Oil Tank Working Rate	<b>2,527</b>	<b>2,521</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>33,212</b>	<b>33,205</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAGAN ROACH T5N-R67W-S1 L01**

Consent Decree Tank System Number: **21**

**Audit Notes**

**1. Facility walkdown checklist inconsistencies**

The STEM Work Request (Final Packet, pg 3) requests an oil tank be disconnected from the fill header and converted to a vapor headspace tank. The Job Sheet (Final Packet, pg 23) indicates an oil tank was converted into a vapor headspace tank. Item C13 of the STEM Walkdown Checklist (Final Packet, pg 7) is checked "yes", indicating LP separators can produce into all tanks.

Given this inconsistency, the Walkdown Checklist has not been used as confirmation of changes on site.

**2. Separator maximum operating pressure discrepancy**

The Job Sheet (Final Packet pg 23) indicates the separator maximum operating pressure was set to 50 psig. The STEM Work Request form (Final Packet pg 3) and Automation Email (Final Packet pg 22) indicate the separator maximum operating pressure was set to 70 psig. The Signed Evaluation used 70 psig and would overestimate the actual PPIVFR if the set point were in fact 50 psig.

**3. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 13-18) are not dated, no facility scouting date included. Date assumed to be prior to STEM Work Request Form date (12/10/2015).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAMIREZ T7N-R63W-S29 L01**

Consent Decree Tank System Number: **1987**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RAMIREZ T7N-R63W-S29 L01_FINAL PACKET	.pdf	9/29/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RAMIREZ T7N-R63W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	7/14/2017	STEM Engineering Evaluation Spreadsheet
RAMIREZ T7N-R63W-S29 L01_SIGNED EVAL (1)	.pdf	7/20/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RAMIREZ T7N-R63W-S29 L01_FINAL PACKET	.pdf	9/29/2017	Work Request
RAMIREZ T7N-R63W-S29 L01_FINAL PACKET	.pdf	9/29/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RAMIREZ T7N-R63W-S29 L01_WALKDOWN	.pdf	7/18/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RAMIREZ T7N-R63W-S29 L01_IR VERIFICATION	.pdf	7/15/2016	IR Verification Field Data Sheet
RAMIREZ T7N-R63W-S29 L01_1272_NORMAL	.mp4	7/12/2016	IR Camera Video Normal Operations
RAMIREZ T7N-R63W-S29 L01_1273_DUMP	.mp4	7/12/2016	IR Camera Video During Dump Event
RAMIREZ T7N-R63W-S29 L01_1274_POST	.mp4	7/12/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RAMIREZ T7N-R63W-S29 L01_SIGNED EVAL (1)	.pdf	7/20/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAMIREZ T7N-R63W-S29 L01**

Consent Decree Tank System Number: **1987**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>165</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>36,080</b>	<b>36,082</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,659</b>	<b>9,153</b>	
Headspace Surge Capacity (scfh)	<b>128,717</b>	<b>128,717</b>	
Total VCS Capacity (scfh)	<b>135,376</b>	<b>137,870</b>	
VCS Capacity minus PPIVF (scfh)	<b>99,296</b>	<b>101,788</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 11/16/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 11/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAMIREZ T7N-R63W-S29 L01**

Consent Decree Tank System Number: **1987**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.66</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.77</b>							
Gas/Oil Ratio (scf/bbl)	<b>320.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.80</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>12.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>624</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>178</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2372</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>759.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>23</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>31,665</b>	<b>31,665</b>
Oil Tank Working Rate	<b>940</b>	<b>937</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>36,082</b>	<b>36,080</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** RAMIREZ T7N-R63W-S29 L01

**Consent Decree Tank System Number:** 1987

**Audit Notes**

The walkdown checklist (RAMIREZ T7N-R63W-S29 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (RAMIREZ T7N-R63W-S29 L01\_FINAL PACKET).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAYGLO T6N-R64W-S14 L01**

Consent Decree Tank System Number: **591**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RAYGLO T6N-R64W-S14 L01_FINAL PACKET	.pdf	1/19/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RAYGLO T6N-R64W-S14 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	12/4/2017	STEM Engineering Evaluation Spreadsheet
240_RAYGLO T6N-R64W-S14 L01_STEM Engineering Evaluation_rev1_with TLO_update	.xlsm	12/21/2018	Updated STEM Engineering Evaluation Spreadsheet
RAYGLO T6N-R64W-S14 L01_SIGNED EVAL	.pdf	12/8/2017	Final Signed Engineering Evaluation
240_RAYGLO T6N-R64W-S14 L01_SIGNED EVAL_rev	.pdf	12/21/2018	Updated Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RAYGLO T6N-R64W-S14 L01_FINAL PACKET	.pdf	1/19/2016	Work Request
RAYGLO T6N-R64W-S14 L01_FINAL PACKET	.pdf	1/19/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RAYGLO T6N-R64W-S14 L01_WALKDOWN	.pdf	1/19/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RAYGLO T6N-R64W-S14 L01_IR VERIFICATION	.pdf	1/14/2016	IR Verification Field Data Sheet
RAYGLO T6N-R64W-S14 L01_0003_NORMAL	.mp4	1/14/2016	IR Camera Video Normal Operations
RAYGLO T6N-R64W-S14 L01_0004_DUMP	.mp4	1/14/2016	IR Camera Video During Dump Event
RAYGLO T6N-R64W-S14 L01_0005_POST	.mp4	1/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RAYGLO T6N-R64W-S14 L01_SIGNED EVAL	.pdf	12/8/2017	Final Signed Engineering Evaluation
Plan_Rev	.pdf	12/21/2018	Updated Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **RAYGLO T6N-R64W-S14 L01**

**Consent Decree Tank System Number:** **591**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>9</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>	<b>60</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>60</b>	<b>60</b>	<b>60</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>3</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>29,017</b>	<b>29,259</b>	<b>1%</b>
Calculated Burner Capacity (scfh)	<b>6,856</b>	<b>17,500</b>	
Headspace Surge Capacity (scfh)	<b>32,888</b>	<b>32,888</b>	
Total VCS Capacity (scfh)	<b>39,744</b>	<b>50,388</b>	
VCS Capacity minus PPIVF (scfh)	<b>10,727</b>	<b>21,129</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/18/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 10/10/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAYGLO T6N-R64W-S14 L01**

Consent Decree Tank System Number: **591**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61	0.61					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	0.72	0.72	0.72					
Gas/Oil Ratio (scf/bbl)	96.4	96.4	96.4					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.80	0.80	0.80					
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20	12.20	12.20					
Critical Pressure (psia) <sup>b</sup>	530	530	530					
Vapor Pressure (psia) <sup>c</sup>	73	73	73					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86	0.86	0.86					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	1320	1320	1320					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	127.2	127.2	127.2					
Working Flow (Mscfd) <sup>h,i</sup>	13	13	13					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78	0.78	0.78	0.78		
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20	7.20	7.20	7.20		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	3906	3906	3906	1629	1629	1629		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	16	16	16	7	7	7		
Working Flow (Mscfd) <sup>l</sup>	22	22	22	9	9	9		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	51	11

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	15,896	15,896
Oil Tank Working Rate	1,569	1,565
Water Tank Flash Rate	2,768	2,767
Water Tank Working Rate	3,885	3,885
Tank Breathing Rate	2,615	2,377
Truck Loading Vapor	2,527	2,527
Total	29,259	29,017

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RAYGLO T6N-R64W-S14 L01**

Consent Decree Tank System Number: **591**

**Audit Notes**

The walkdown checklist (RAYGLO T6N-R64W-S14 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (RAYGLO T6N-R64W-S14 L01\_FINAL PACKET).

The Field datasheet (RAYGLO T6N-R64W-S14 L01\_FINAL PACKET, p 4 & 6-7) has a total of 17 oil tanks and 4 water tanks. The Walkdown checklist (RAYGLO T6N-R64W-S14 L01\_WALKDOWN, p 4) lists 2 banks of tanks, each only consisting of 10 tanks. The model was run with a bank of 9 oil tanks and 2 water tanks to be conservative. The signed evaluation from 12/10/2018 confirms the correct bank.

The STEM work request (RAYGLO T6N-R64W-S14 L01\_FINAL PACKET, p 3) requests the dump valves be changed to 3/4" trim. The Job Sheet (RAYGLO T6N-R64W-S14 L01\_FINAL PACKET, p 24) does not mention any dump valves were replaced. A1 of the STEM RETROFIT WALKDOWN CHECKLIST (RAYGLO T6N-R64W-S14 L01\_FINAL PACKET, p 16) confirms the oil dump trims were consistent with the engineering evaluation, and therefore assumed to be 3/4" (RAYGLO T6N-R64W-S14 L01\_SIGNED EVAL, p 2). New Signed Eval document from 12/10/2018 confirms the oil dump valves have been changed to 3/4".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REBA T6N-R64W-S31 L01**

Consent Decree Tank System Number: **1320**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
REBA T6N-R64W-S31 L01_FINAL PACKET	.pdf	12/8/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
REBA T6N-R64W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	12/7/2016	STEM Engineering Evaluation Spreadsheet
REBA T6N-R64W-S31 L01_SIGNED EVAL	.pdf	12/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
REBA T6N-R64W-S31 L01_FINAL PACKET	.pdf	12/8/2016	Work Request
REBA T6N-R64W-S31 L01_FINAL PACKET	.pdf	12/8/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
REBA T6N-R64W-S31 L01_FINAL PACKET	.pdf	12/8/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
REBA T6N-R64W-S31 L01_IR VERIFICATION	.pdf	12/7/2016	IR Verification Field Data Sheet
REBA T6N-R64W-S31 L01_1775_NORMAL	.mp4	12/5/2016	IR Camera Video Normal Operations
REBA T6N-R64W-S31 L01_1776_DUMP	.mp4	12/5/2016	IR Camera Video During Dump Event
REBA T6N-R64W-S31 L01_1777_POST	.mp4	12/5/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
REBA T6N-R64W-S31 L01_SIGNED EVAL	.pdf	12/15/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** REBA T6N-R64W-S31 L01

**Consent Decree Tank System Number:** 1320

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	60							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,444	3,445	0%
Calculated Burner Capacity (scfh)	4,027	4,958	
Headspace Surge Capacity (scfh)	393	393	
Total VCS Capacity (scfh)	4,420	5,351	
VCS Capacity minus PPIVF (scfh)	976	1,907	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 1/2/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/23/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REBA T6N-R64W-S31 L01**

Consent Decree Tank System Number: **1320**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REBA T6N-R64W-S31 L01**

Consent Decree Tank System Number: **1320**

**Audit Notes**

- The final walkdown is not marked as being complete.
  
- The Work Request indicated the oil dump valve on the separator was to be modified to Kimray 1400 with 1/2 inch trim. Could not verify the oil dump valve size (2" or 1") on either separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.
  
- There is no documentation that the 2" VCS line from the tank to the KO was changed to 3". On 5/16/2018 Noble responded that field verification confirming the line was changed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01

**Consent Decree Tank System Number:** 435

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_FINAL PACKET	.pdf	9/29/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	7/5/2016	STEM Engineering Evaluation Spreadsheet
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_FINAL PACKET	.pdf	9/29/2017	Work Request
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_FINAL PACKET	.pdf	9/29/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_WALKDOWN	.pdf	6/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_IR VERIFICATION	.pdf	6/14/2016	IR Verification Field Data Sheet
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_1099_NORMAL	.mp4	6/6/2016	IR Camera Video Normal Operations
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_1100_DUMP	.mp4	6/6/2016	IR Camera Video During Dump Event
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_1101_POST	.mp4	6/6/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01

**Consent Decree Tank System Number:** 435

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,017</b>	<b>9,377</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,802</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>24,122</b>	<b>24,122</b>	
Total VCS Capacity (scfh)	<b>27,924</b>	<b>28,675</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,907</b>	<b>19,298</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 11/16/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01**

Consent Decree Tank System Number: **435**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78	0.78						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	23	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
Total	9,377	9,017

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01**

Consent Decree Tank System Number: **435**

**Audit Notes**

The Walkdown checklist was not marked as being completed. The site was verified through other supplied documentation in the final packet.

The stem work request (REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01\_FINAL PACKET, p 3) requests that the existing 212 dump valve be replaced with a 1" 1400 with a 1/2" trim. However, the job sheet (REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01\_FINAL PACKET, p 23) does not confirm the new valve size. A1 from the walkdown checklist (REI FED BEEBE DRAW OVIATT T3N-R65W-S10 L01\_WALKDOWN, p2) confirms the 1/2" trim size, but not the valve size. A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

The work request lists converting tank #4 to a headspace tank. The job sheet in the final packet did not verify this action was completed. In response to a data request dated 8/14/2018 Noble stated that "Field verification for this facility was completed on or around 5/11/16, field verification confirmed that tank #4 was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header)."

Field datasheet in the final packet states a Cimarron 48" was installed. The Signed Eval uses a Cimarron 48 HV. A Cimarron 48 has a much lower capacity than a 48 HV. In response to a data request dated 8/14/2018 Noble stated that "Field verification for this facility was completed on or around 6/6/2016. Field verification confirmed that the model of the control device installed for the oil tank VCS is the Cimarron 48 HV."

The site was selected for an additional IR Camera inspection because the footage is very shaky.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REIN T4N-R64W-S1 L01**

Consent Decree Tank System Number: **947**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
REIN T4N-R64W-S1 L01_FINAL PACKET	.pdf	3/30/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
REIN T4N-R64W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	4/4/2017	STEM Engineering Evaluation Spreadsheet
REIN T4N-R64W-S1 L01_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
REIN T4N-R64W-S1 L01_FINAL PACKET	.pdf	3/30/2017	Work Request
REIN T4N-R64W-S1 L01_FINAL PACKET	.pdf	3/30/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
REIN T4N-R64W-S1 L01_FINAL PACKET	.pdf	3/30/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
REIN T4N-R64W-S1 L01_IR VERIFICATION	.pdf	3/30/2017	IR Verification Field Data Sheet
REIN T4N-R64W-S1 L01_1899_NORMAL	.mp4	3/27/2017	IR Camera Video Normal Operations
REIN T4N-R64W-S1 L01_1900_DUMP	.mp4	3/27/2017	IR Camera Video During Dump Event
REIN T4N-R64W-S1 L01_1901_POST	.mp4	3/27/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
REIN T4N-R64W-S1 L01_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** REIN T4N-R64W-S1 L01

**Consent Decree Tank System Number:** 947

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	115							
Dump Valve Size & Trim Size (in)	2" & 3/8"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7	LEED EC48-2S		
Number of Units	1	1		
Man. Capacity (MSCFD)	140	119		

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	5,223	5,531	6%
Calculated Burner Capacity (scfh)	6,698	10,792	
Headspace Surge Capacity (scfh)	0	0	
Total VCS Capacity (scfh)	6,698	10,792	
VCS Capacity minus PPIVF (scfh)	1,475	5,261	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 8/9/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REIN T4N-R64W-S1 L01**

Consent Decree Tank System Number: **947**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.30</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.41</b>							
Gas/Oil Ratio (scf/bbl)	<b>198.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>579</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>128</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>610</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>121.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>6</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>5,051</b>	<b>4,758</b>
Oil Tank Working Rate	<b>242</b>	<b>227</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,531</b>	<b>5,223</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REIN T4N-R64W-S1 L01**

Consent Decree Tank System Number: **947**

**Audit Notes**

-A new HP separator was brought on-site to replace a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 3/8" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

-The work request stated that the 2" VOC line from the tanks to KO was to be replaced with a 3" line. No documentation was provided to confirm this was completed. In response to a data request Noble stated "Field verification for this facility was completed on or around 3/1/2017, field verification confirmed that the 3" VOC line from the tanks to KO was installed"

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REINICK T4N-R64W-S9 L02**

Consent Decree Tank System Number: **653/793**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_FINAL PACKET	.pdf	3/12/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_SIGNED EVAL	.pdf	3/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_FINAL PACKET	.pdf	3/12/2018	Work Request
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_FINAL PACKET	.pdf	3/12/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_WALKDOWN	.pdf	3/9/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_IR VERIFICATION	.pdf	3/9/2018	IR Verification Field Data Sheet
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_0102_NORMAL	.mp4	3/9/2018	IR Camera Video Normal Operations
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_0103_DUMP	.mp4	3/9/2018	IR Camera Video During Dump Event
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_0104_POST	.mp4	3/9/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
REINICK T4N-R64W-S9 L03 & REINICK T4N-R64W-S9 L02_SIGNED EVAL	.pdf	3/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **REINICK T4N-R64W-S9 L02**  
**Consent Decree Tank System Number:** **653/793**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,017</b>	<b>9,377</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>7,226</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>5,082</b>	<b>5,082</b>	
Total VCS Capacity (scfh)	<b>12,308</b>	<b>14,282</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,291</b>	<b>4,905</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/25/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/19/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REINICK T4N-R64W-S9 L02**

Consent Decree Tank System Number: **653/793**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	23	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>9,377</b>	<b>9,017</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REINICK T4N-R64W-S9 L02**

Consent Decree Tank System Number: **653/793**

**Audit Notes**

The Work Request indicated the oil dump valves on both HLP Separators were to be modified to Kimray 1400 with 1/2" trims. Could not verify the oil dump valve size (2" or 1") on either separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The Work Request indicated the automated PSHH for both HLP Separators was to be set to 70 psig triggering a wellhead shut-in. No confirmation provided in initial documentation that the setpoint was implemented for the separators.

Noble provided information on 11/14/2018 indicating "Automation verification for this facility was completed on or around 1/11/2018, automation verification confirmed that the PSHH setting on the LP Separators was set at no higher than 70 psig." The Modeling Guidance was determined to be correctly applied for the separator maximum operating pressure based on the provided automation verification information.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REISTAD T4N-R64W-S5 L01**

Consent Decree Tank System Number: **795**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
REISTAD T4N-R64W-S5 L01_FINAL PACKET	.pdf	2/17/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
REISTAD T4N-R64W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	12/19/2016	STEM Engineering Evaluation Spreadsheet
REISTAD T4N-R64W-S5 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
REISTAD T4N-R64W-S5 L01_FINAL PACKET	.pdf	2/17/2016	Work Request
REISTAD T4N-R64W-S5 L01_FINAL PACKET	.pdf	2/17/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
REISTAD T4N-R64W-S5 L01_WALKDOWN	.pdf	2/17/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
REISTAD T4N-R64W-S5 L01_IR VERIFICATION	.pdf	2/12/2016	IR Verification Field Data Sheet
REISTAD T4N-R64W-S5 L01_0683_NORMAL	.mp4	2/11/2016	IR Camera Video Normal Operations
REISTAD T4N-R64W-S5 L01_0684_DUMP	.mp4	2/11/2016	IR Camera Video During Dump Event
REISTAD T4N-R64W-S5 L01_0685_POST	.mp4	2/11/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
REISTAD T4N-R64W-S5 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** REISTAD T4N-R64W-S5 L01

**Consent Decree Tank System Number:** 795

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,554</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>578</b>	<b>578</b>	
Total VCS Capacity (scfh)	<b>4,132</b>	<b>5,131</b>	
VCS Capacity minus PPIVF (scfh)	<b>688</b>	<b>1,686</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 11/13/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REISTAD T4N-R64W-S5 L01**

Consent Decree Tank System Number: **795**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **REISTAD T4N-R64W-S5 L01**

Consent Decree Tank System Number: **795**

**Audit Notes**

The walkdown checklist (REISTAD T4N-R64W-S5 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (REISTAD T4N-R64W-S5 L01\_FINAL PACKET).

The STEM work request form (REISTAD T4N-R64W-S5 L01\_FINAL PACKET, p 3) requested the existing 2" 212 valve (REISTAD T4N-R64W-S5 L01\_FINAL PACKET, p 13) be replaced with a 1" 1400 valve with a 1/2" trim. Item A1 of the Walkdown Checklist confirms the oil trim sizes are consistent with the STEM Evaluation. However, there is still no confirmation of the oil valve size. A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

Item B3 of the Walkdown Checklist confirms that the PSHH for the LP separator is installed and set according to the design. Additionally, the L.P. Header Standard Design 125# drawing depicts the design to include a Fisher 4660 and Versa Valve downstream of the PSHH. Updated the Audit Checklist tab with the pressures specified in the Work Request form and used in the Signed Eval.

The documentation shows that initially, there was only one combustor on site (Leed) used for condensate tank vapor combustion. The Work Request form specified that the Leed burner be removed. Removal was not confirmed in the documentation. The Work Request form specified the installation of one new Leed EC48-2S (LP header combustor), and one Cimarron 48HV (tank vapor combustor). The installation of both combustors is confirmed in the Job Sheets (pg. 12/25 of the Final Packet). Google Earth photos of the site (in 2016 and 2017) confirm there are two combustors on site. Although the removal of the existing Leed combustor was not confirmed in the documentation, the installation of the two requested combustors is confirmed. The Signed Eval confirms the use of the installed Cimarron 48HV for tank vapor control as specified in the Work Request form. No additional information is needed for the combustors.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RICHARDSON BARTON T4N-R64W-S10 L01**

Consent Decree Tank System Number: **635**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L01_FINAL PACKET	.pdf	4/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L01_STEM Engineering Evaluation_rev1	.xls	5/3/2016	STEM Engineering Evaluation Spreadsheet
RICHARDSON BARTON T4N-R64W-S10 L01_Final Signed STEM Plan	.pdf	6/7/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L01_FINAL PACKET	.pdf	4/29/2016	Work Request
RICHARDSON BARTON T4N-R64W-S10 L01_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L01_WALKDOWN	.pdf	4/29/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L01_IR VERIFICATION	.pdf	4/27/2016	IR Verification Field Data Sheet
RICHARDSON BARTON T4N-R64W-S10 L01_0902_NORMAL	.mp4	4/25/2016	IR Camera Video Normal Operations
RICHARDSON BARTON T4N-R64W-S10 L01_0903_DUMP	.mp4	4/25/2016	IR Camera Video During Dump Event
RICHARDSON BARTON T4N-R64W-S10 L01_0904_POST	.mp4	4/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L01_SIGNED EVAL	.pdf	5/5/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** RICHARDSON BARTON T4N-R64W-S10 L01

**Consent Decree Tank System Number:** 635

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>14,321</b>	<b>14,321</b>	
Total VCS Capacity (scfh)	<b>17,046</b>	<b>20,154</b>	
VCS Capacity minus PPIVF (scfh)	<b>12,538</b>	<b>15,645</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:	Chris Boggess
Audit Document Review Date:	1/5/2018
Audit Document Review Verified by:	Craig Bock
Audit Document Verification Date:	9/23/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RICHARDSON BARTON T4N-R64W-S10 L01**

Consent Decree Tank System Number: **635**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RICHARDSON BARTON T4N-R64W-S10 L01**

Consent Decree Tank System Number: **635**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

CB - Oil Dump Valve Trim Sizes: The "Yes" selection of Item A1 of the Walkdown Checklist will be considered confirmation that the valve trim sizes are consistent with the Engineering Evaluation.

CB - No further information is needed for this analysis.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Richardson Barton T4N-R64W-S10 L02**

Consent Decree Tank System Number: **642**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L02_FINAL PACKET	.pdf	1/27/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L02_STEM Engineering Evaluation_rev1	.xlsm	1/31/2017	STEM Engineering Evaluation Spreadsheet
RICHARDSON BARTON T4N-R64W-S10 L02_IR VERIFICATION	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L02_FINAL PACKET	.pdf	1/27/2017	Work Request
RICHARDSON BARTON T4N-R64W-S10 L02_FINAL PACKET	.pdf	1/27/2017	Construction Jobsheets
2018 Draft Attachments to Comment Letter	.pdf	3/27/2020	Supplimental Completion Documentation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L02_WALKDOWN	.pdf	1/27/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L02_IR VERIFICATION	.pdf	10/29/2017	IR Verification Field Data Sheet
RICHARDSON BARTON T4N-R64W-S10 L02_1296_NORMAL	.mp4	10/28/2017	IR Camera Video Normal Operations
RICHARDSON BARTON T4N-R64W-S10 L02_1297_DUMP	.mp4	10/28/2017	IR Camera Video During Dump Event
RICHARDSON BARTON T4N-R64W-S10 L02_1298_POST	.mp4	10/28/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RICHARDSON BARTON T4N-R64W-S10 L02_IR VERIFICATION	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Richardson Barton T4N-R64W-S10 L02**

Consent Decree Tank System Number: **642**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>119</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,582</b>	<b>13,584</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,812</b>	<b>10,792</b>	
Headspace Surge Capacity (scfh)	<b>27,814</b>	<b>27,814</b>	
Total VCS Capacity (scfh)	<b>32,626</b>	<b>38,606</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,044</b>	<b>25,022</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/26/2018  
 Audit Document Review Verified by: Angela M. Oberlander and James Van Horne  
 Audit Document Verification Date: 12/18/2018 and 7/6/2020



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Richardson Barton T4N-R64W-S10 L02**

Consent Decree Tank System Number: **642**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.50</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.61</b>							
Gas/Oil Ratio (scf/bbl)	<b>256.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>601</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>153</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1184</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>303.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>11</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>12,639</b>	<b>12,639</b>
Oil Tank Working Rate	<b>469</b>	<b>468</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>13,584</b>	<b>13,582</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **Richardson Barton T4N-R64W-S10 L02**

Consent Decree Tank System Number: **642**

**Audit Notes**

The NEI evaluation accounted for oil dumps from a single separator. The initial Field Data Collection information as well as the Signed Evaluation indicate there are two HP separators on site capable of dumping liquids to the storage tanks. In a letter response to the draft audit report on 3/27/2020 Noble stated that "Noble confirmed accuracy of the existing Engineering Evaluation. While it is accurate that there are two separator trains capable of dumping liquids to the storage tanks, the work request and Engineering Evaluation specify that wellhead automation be used to limit separator operation to one separator at a time." Given this information it has been determined that the modeling guideline for this facility has been applied correctly

The separators on location have pressure controlled by pneumatic controllers. The initial provided documentation did not confirm the controller shut-in pressure for the HP Separator was set to 140 psig as requested in the STEM Work Request dated 5/17/2016.

The separator pneumatic PSHH is set by the operator, not automation personnel, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states the separator cannot operate above 140 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation. It was determined the Modeling Guidelines were appropriately applied based on the administrative use of the One-Pager.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RICHTER USX T7N-R64W-S27 L01**

Consent Decree Tank System Number: **598**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RICHTER USX T7N-R64W-S27 L01_FINAL PACKET	.pdf	12/14/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RICHTER USX T7N-R64W-S27 L01_STEM Engineering Evaluation_rev1	.xlsm	1/11/2018	STEM Engineering Evaluation Spreadsheet
RICHTER USX T7N-R64W-S27 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RICHTER USX T7N-R64W-S27 L01_FINAL PACKET / RICHTER USX T7N-R64W-S27 L01_COMPLETED TLO	.pdf	12/14/2015 // 5/21/2018	Work Request
RICHTER USX T7N-R64W-S27 L01_FINAL PACKET / RICHTER USX T7N-R64W-S27 L01_COMPLETED TLO	.pdf	12/14/2015 // 5/21/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RICHTER USX T7N-R64W-S27 L01_WALKDOWN	.pdf	12/14/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RICHTER USX T7N-R64W-S27 L01_IR VERIFICATION	.pdf	12/11/2015	IR Verification Field Data Sheet
RICHTER USX T7N-R64W-S27 L01_0498_NORMAL	.mp4	12/9/2015	IR Camera Video Normal Operations
RICHTER USX T7N-R64W-S27 L01_0499_DUMP	.mp4	12/9/2015	IR Camera Video During Dump Event
RICHTER USX T7N-R64W-S27 L01_0500_POST	.mp4	12/9/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RICHTER USX T7N-R64W-S27 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RICHTER USX T7N-R64W-S27 L01**

Consent Decree Tank System Number: **598**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>7</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>16,464</b>	<b>16,466</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,067</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>96,185</b>	<b>96,185</b>	
Total VCS Capacity (scfh)	<b>102,252</b>	<b>106,618</b>	
VCS Capacity minus PPIVF (scfh)	<b>85,788</b>	<b>90,152</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/5/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/5/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RICHTER USX T7N-R64W-S27 L01**

Consent Decree Tank System Number: **598**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>40</b>	<b>0</b>

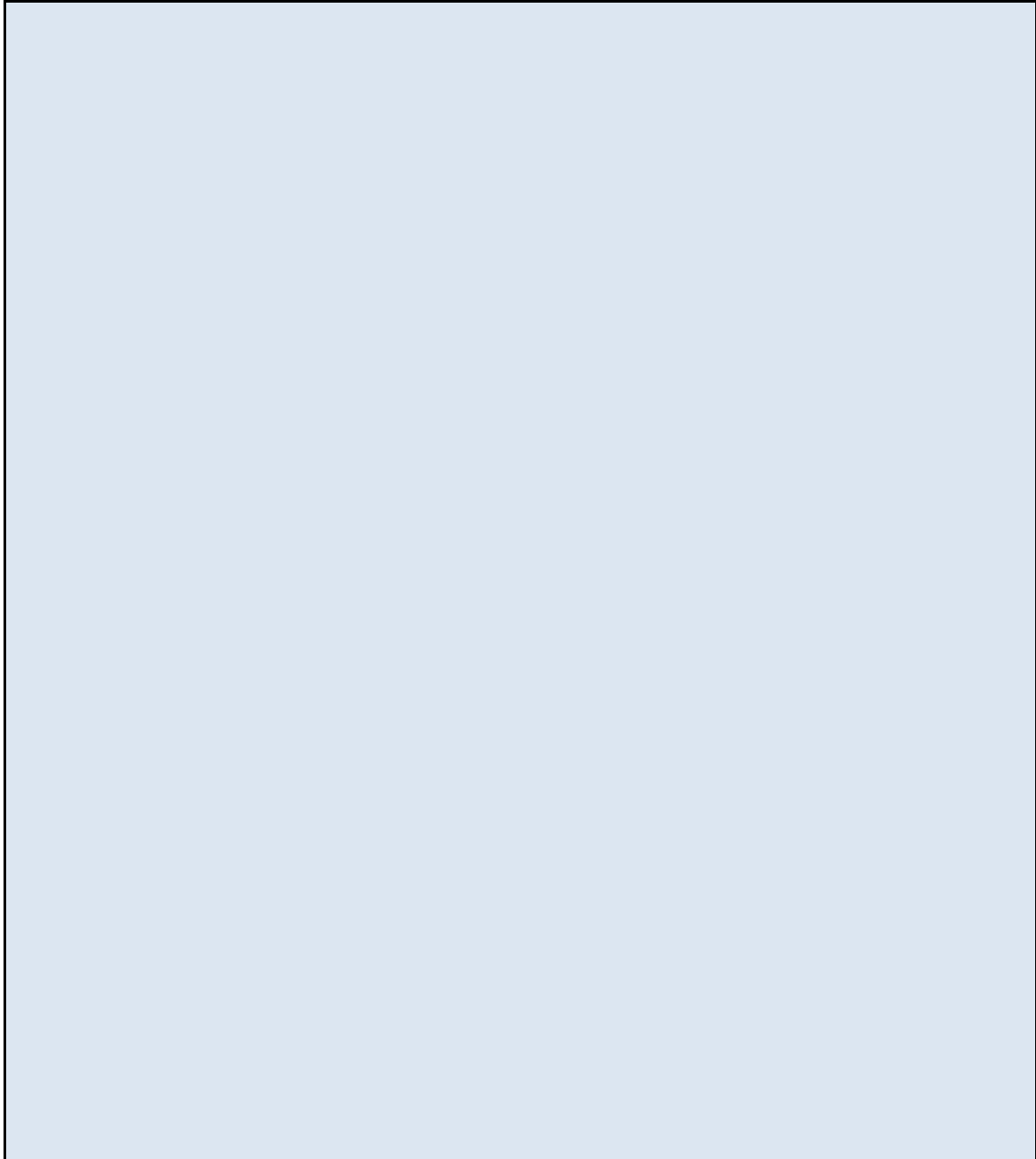
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,664</b>	<b>1,664</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>16,466</b>	<b>16,464</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RICHTER USX T7N-R64W-S27 L01**

Consent Decree Tank System Number: **598**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RITCHEY T3N-R65W-S27 L03**

Consent Decree Tank System Number: **411**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RITCHEY T3N-R65W-S27 L03_FINAL PACKET	.pdf	12/9/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RITCHEY T3N-R65W-S27 L03_STEM Engineering Evaluation_rev1	.xlsm	12/14/2017	STEM Engineering Evaluation Spreadsheet
RITCHEY T3N-R65W-S27 L03_SIGNED EVAL	.pdf	1/3/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RITCHEY T3N-R65W-S27 L03_FINAL PACKET	.pdf	12/9/2015	Work Request
RITCHEY T3N-R65W-S27 L03_FINAL PACKET	.pdf	12/9/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RITCHEY T3N-R65W-S27 L03_WALKDOWN	.pdf	12/9/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RITCHEY T3N-R65W-S27 L03_IR VERIFICATION	.pdf	12/8/2015	IR Verification Field Data Sheet
RITCHEY T3N-R65W-S27 L03_0479_NORMAL	.mp4	12/1/2015	IR Camera Video Normal Operations
RITCHEY T3N-R65W-S27 L03_0478_DUMP	.mp4	12/1/2015	IR Camera Video During Dump Event
RITCHEY T3N-R65W-S27 L03_0480_POST	.mp4	12/1/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RITCHEY T3N-R65W-S27 L03_SIGNED EVAL	.pdf	1/3/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** RITCHEY T3N-R65W-S27 L03

**Consent Decree Tank System Number:** 411

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,157</b>	<b>4,158</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,927</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>5,704</b>	<b>5,704</b>	
Total VCS Capacity (scfh)	<b>9,631</b>	<b>10,662</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,474</b>	<b>6,504</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/11/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/11/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RITCHEY T3N-R65W-S27 L03**

Consent Decree Tank System Number: **411**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,158</b>	<b>4,157</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RITCHEY T3N-R65W-S27 L03**

Consent Decree Tank System Number: **411**

**Audit Notes**

The signed eval and stem engineering evaluation show the site to have been modeled with two (2) headers from tank to KO however all of the data provided within the final packet show only one (1) header from tank to KO to exist.

The Engineering Design Standard was not followed, however, the VCS capacity is adequate during peak flow conditions using a single header.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RIVA BLUE DECHANT T3N-R64W-S31 L01**

Consent Decree Tank System Number: **419**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
RIVA BLUE DECHANT T3N-R64W-S31 L01_FINAL PACKET	.pdf	3/11/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
RIVA BLUE DECHANT T3N-R64W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	3/11/2016	STEM Engineering Evaluation Spreadsheet
RIVA BLUE DECHANT T3N-R64W-S31 L01_SIGNED EVAL	.pdf	3/17/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
RIVA BLUE DECHANT T3N-R64W-S31 L01_FINAL PACKET	.pdf	3/11/2016	Work Request
RIVA BLUE DECHANT T3N-R64W-S31 L01_FINAL PACKET	.pdf	3/11/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
RIVA BLUE DECHANT T3N-R64W-S31 L01_WALKDOWN	.pdf	3/10/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
RIVA BLUE DECHANT T3N-R64W-S31 L01_IR VERIFICATION	.pdf	3/10/2016	IR Verification Field Data Sheet
RIVA BLUE DECHANT T3N-R64W-S31 L01_IR VERIFICATION	.pdf	3/10/2016	IR Camera Video Normal Operations
RIVA BLUE DECHANT T3N-R64W-S31 L01_IR VERIFICATION	.pdf	3/10/2016	IR Camera Video During Dump Event
RIVA BLUE DECHANT T3N-R64W-S31 L01_IR VERIFICATION	.pdf	3/10/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
RIVA BLUE DECHANT T3N-R64W-S31 L01_SIGNED EVAL	.pdf	3/17/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **RIVA BLUE DECHANT T3N-R64W-S31 L01**

**Consent Decree Tank System Number:** **419**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>16,723</b>	<b>16,723</b>	
Total VCS Capacity (scfh)	<b>19,639</b>	<b>22,556</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,893</b>	<b>17,809</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/6/2018 & 12/13/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 12/14/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RIVA BLUE DECHANT T3N-R64W-S31 L01**

Consent Decree Tank System Number: **419**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RIVA BLUE DECHANT T3N-R64W-S31 L01**

Consent Decree Tank System Number: **419**

**Audit Notes**

**Vapor Surge Vessel**

Noble confirmed via data request received on 12/10/2018 that field verification for the facility was completed on or around 2/23/2016 and confirmed that one (1) tank was converted to a headspace tank.

**Oil Dump Valve and Trim Size**

The STEM Work Request (Final Packet, pg 3) indicates it was requested the 270# separator previously onsite be converted to LP separator. The Job Sheet (Final Packet, pg 22) indicates the site was converted to HP/LP setup, the separator with SN 7628 was converted to LP separator. This separator previously had a 1" oil dump valve with 1" trim.

ITEM A1 of the STEM Walkdown Checklist is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation, and is therefore 1/2".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROADIFER T5N-R65W-S12 L01**

Consent Decree Tank System Number: **991**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ROADIFER T5N-R65W-S12 L01_FINAL PACKET	.pdf	11/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ROADIFER T5N-R65W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	11/11/2016	STEM Engineering Evaluation Spreadsheet
ROADIFER T5N-R65W-S12 L01_SIGNED EVAL	.pdf	11/14/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ROADIFER T5N-R65W-S12 L01_FINAL PACKET	.pdf	11/11/2016	Work Request
ROADIFER T5N-R65W-S12 L01_FINAL PACKET	.pdf	11/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ROADIFER T5N-R65W-S12 L01_WALKDOWN	.pdf	11/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ROADIFER T5N-R65W-S12 L01_IR VERIFICATION	.pdf	11/8/2016	IR Verification Field Data Sheet
ROADIFER T5N-R65W-S12 L01_1687_NORMAL	.mp4	11/8/2016	IR Camera Video Normal Operations
ROADIFER T5N-R65W-S12 L01_1688_DUMP	.mp4	11/8/2016	IR Camera Video During Dump Event
ROADIFER T5N-R65W-S12 L01_1689_POST	.mp4	11/8/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ROADIFER T5N-R65W-S12 L01_SIGNED EVAL	.pdf	11/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROADIFER T5N-R65W-S12 L01**

Consent Decree Tank System Number: **991**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>456</b>	<b>546</b>	
Total VCS Capacity (scfh)	<b>4,483</b>	<b>5,504</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,039</b>	<b>1,917</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 11/16/2017  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROADIFER T5N-R65W-S12 L01**

Consent Decree Tank System Number: **991**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROADIFER T5N-R65W-S12 L01**

Consent Decree Tank System Number: **991**

**Audit Notes**

**1. Unable to verify size of tank VOC line to knockout**

The Field Datasheet (pg 13 of Final Packet) indicates the existing tank VOC line to the knockout (KO) is 2". The STEM work request (pg 3 of Final Packet) and Signed Eval indicate this was to be changed to a 3" line. No indication that this line was modified 3" was observed in the documentation provided by Noble.

*Request data from Noble to verify the size of the tank VOC line currently onsite.*

*Update 8/13/2018 - Noble confirms a 3" tank to KO VOC line is onsite.*

**2. Unable to verify separator dump valve size**

The STEM work request (pg 3 of Final Packet) indicates the existing 2" separator dump valve be replaced with a 1" valve and 1/2" trim. The Job Sheet (pg 23 of Final Packet) provides confirmation a 1/2" trim was installed. However, no indication the existing 2" valve was changed to a 1" valve was observed and therefore the modeling guideline is not being met. (It was noted the modeled VCS capacity remains sufficient for a 2" valve size)

**3. Separator PSHH pressure setting discrepancy (overly conservative - no issue with engineering design)**

The Job Sheet (pg 23 of the Final Packet) indicates the pneumatic PSHH was set to 50 psig. An email from the automation consultant (pg 22 of the Final Packet) indicates the separator maximum pressure was set to 60 psig. The Engineering Design (Signed Eval) was run using the more conservative set point pressure of 60 psig.

**4. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 12-19) are not dated. Assumed the date is the same as Facility Scouting date (8/15/16).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROHR HANNAH T6N-R64W-S28 L01**

Consent Decree Tank System Number: **278**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ROHR HANNAH T6N-R64W-S28 L01_FINAL PACKET	.pdf	5/21/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ROHR HANNAH T6N-R64W-S28 L01_STEM Engineering Evaluation_rev1	.xlsm	5/13/2016	STEM Engineering Evaluation Spreadsheet
ROHR HANNAH T6N-R64W-S28 L01_SIGNED EVAL	.pdf	5/24/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ROHR HANNAH T6N-R64W-S28 L01_FINAL PACKET	.pdf	5/21/2018	Work Request
ROHR HANNAH T6N-R64W-S28 L01_FINAL PACKET	.pdf	5/21/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ROHR HANNAH T6N-R64W-S28 L01_WALKDOWN	.pdf	4/25/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ROHR HANNAH T6N-R64W-S28 L01_IR VERIFICATION	.pdf	4/21/2016	IR Verification Field Data Sheet
ROHR HANNAH T6N-R64W-S28 L01_0884_NORMAL	.pdf	4/19/2016	IR Camera Video Normal Operations
ROHR HANNAH T6N-R64W-S28 L01_0885_DUMP	.mp4	4/19/2016	IR Camera Video During Dump Event
ROHR HANNAH T6N-R64W-S28 L01_0886_POST	.mp4	4/19/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ROHR HANNAH T6N-R64W-S28 L01_SIGNED EVAL	.pdf	5/24/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ROHR HANNAH T6N-R64W-S28 L01**

**Consent Decree Tank System Number:** **278**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,436</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,813</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>72</b>	<b>72</b>	
Total VCS Capacity (scfh)	<b>2,885</b>	<b>5,905</b>	
VCS Capacity minus PPIVF (scfh)	<b>449</b>	<b>3,469</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/25/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/2/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROHR HANNAH T6N-R64W-S28 L01**

Consent Decree Tank System Number: **278**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>431</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>48.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,027</b>	<b>2,027</b>
Oil Tank Working Rate	<b>171</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,436</b>	<b>2,436</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROHR HANNAH T6N-R64W-S28 L01**

Consent Decree Tank System Number: **278**

### Audit Notes

The signed evaluation states that the VOC line size from the tank to the KO should be 2". There is not a request to change the line size in the work request (FINAL PACKET p. 3), and there is no way to verify what the original line size was due to the tank field datasheet being marked N/A where this information is usually found (FINAL PACKET p.11)

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROMERO T4N-R65W-S3 L01**

Consent Decree Tank System Number: **1965**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L01_FINAL PACKET	.pdf	8/4/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L01_STEM Engineering Evaluation_rev1	.xlsm	8/18/2017	STEM Engineering Evaluation Spreadsheet
ROMERO T4N-R65W-S3 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L01_FINAL PACKET	.pdf	8/4/2017	Work Request
ROMERO T4N-R65W-S3 L01_FINAL PACKET	.pdf	8/4/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L01_WALKDOWN	.pdf	8/4/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L01_IR VERIFICATION	.pdf	3/22/2018	IR Verification Field Data Sheet
ROMERO T4N-R65W-S3 L01_2192_NORMAL	.mp4	8/1/2017	IR Camera Video Normal Operations
ROMERO T4N-R65W-S3 L01_2193_DUMP	.mp4	8/1/2017	IR Camera Video During Dump Event
ROMERO T4N-R65W-S3 L01_2194_POST	.mp4	8/1/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ROMERO T4N-R65W-S3 L01**

**Consent Decree Tank System Number:** **1965**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,380</b>	<b>2,380</b>	
Total VCS Capacity (scfh)	<b>5,307</b>	<b>8,213</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,002</b>	<b>4,907</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/11/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROMERO T4N-R65W-S3 L01**

Consent Decree Tank System Number: **1965**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

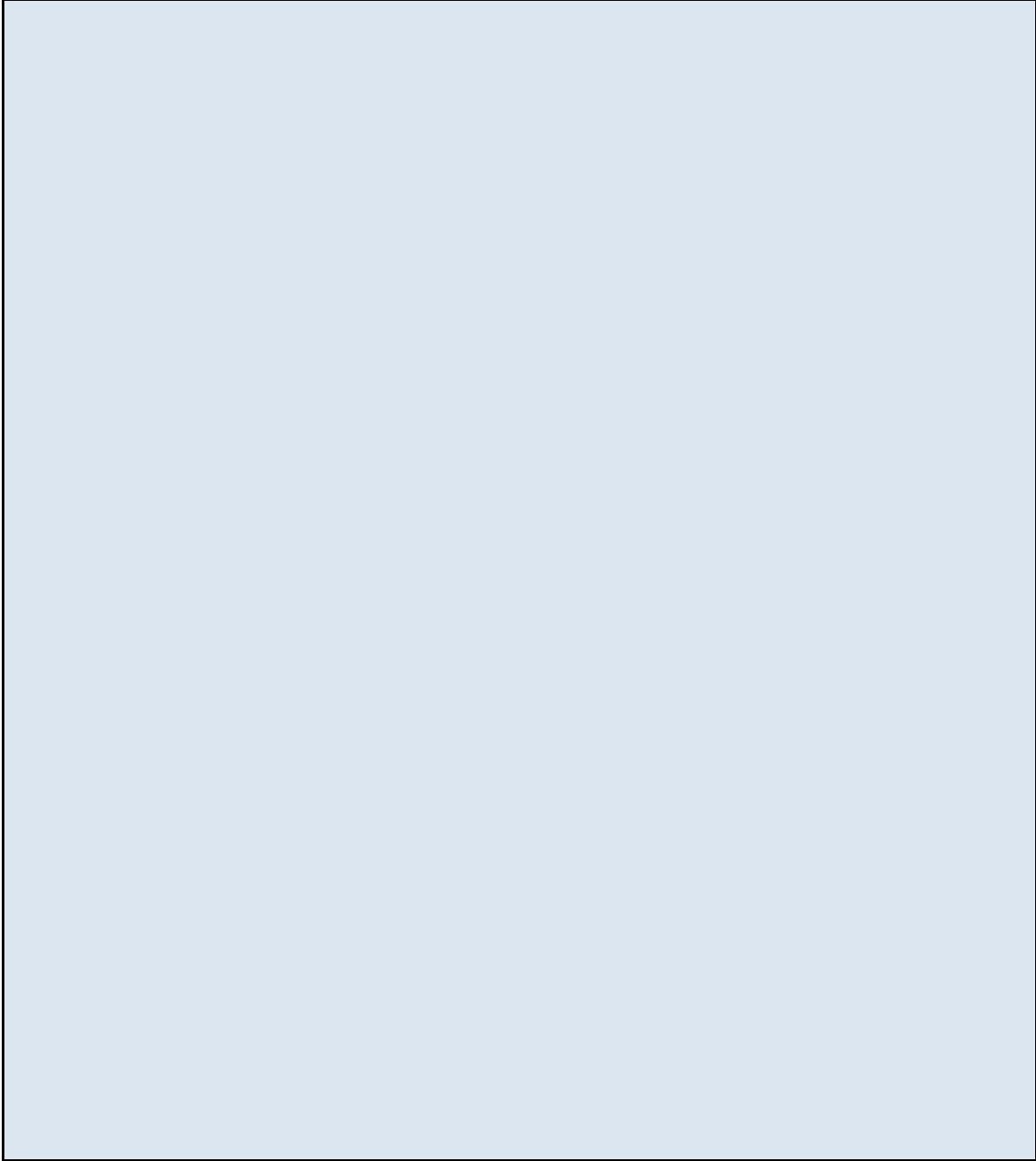
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROMERO T4N-R65W-S3 L01**

Consent Decree Tank System Number: **1965**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROMERO T4N-R65W-S3 L02**

Consent Decree Tank System Number: **2057**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L02_FINAL PACKET	.pdf	9/22/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2017	STEM Engineering Evaluation Spreadsheet
ROMERO T4N-R65W-S3 L02_SIGNED EVAL	.pdf	7/20/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L02_FINAL PACKET	.pdf	9/22/2017	Work Request
ROMERO T4N-R65W-S3 L02_FINAL PACKET	.pdf	9/22/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L02_FINAL PACKET	.pdf	9/22/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L02_IR VERIFICATION	.pdf	7/1/2016	IR Verification Field Data Sheet
ROMERO T4N-R65W-S3 L02_1221_NORMAL	.mp4	6/29/2016	IR Camera Video Normal Operations
ROMERO T4N-R65W-S3 L02_1222_DUMP	.mp4	6/29/2016	IR Camera Video During Dump Event
ROMERO T4N-R65W-S3 L02_1223_POST	.mp4	6/29/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ROMERO T4N-R65W-S3 L02_SIGNED EVAL	.pdf	7/20/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ROMERO T4N-R65W-S3 L02**

**Consent Decree Tank System Number:** **2057**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>21,916</b>	<b>21,923</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>228,022</b>	<b>228,022</b>	
Total VCS Capacity (scfh)	<b>230,938</b>	<b>233,855</b>	
VCS Capacity minus PPIVF (scfh)	<b>209,022</b>	<b>211,933</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 1/2/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/20/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROMERO T4N-R65W-S3 L02**

Consent Decree Tank System Number: **2057**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>-1.02</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>-0.90</b>							
Gas/Oil Ratio (scf/bbl)	<b>22.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>833</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>407</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.76</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>6905</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>158.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>66</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C)	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>11381</b>	<b>11381</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>46</b>	<b>46</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>64</b>	<b>64</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>17</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>6,590</b>	<b>6,590</b>
Oil Tank Working Rate	<b>2,736</b>	<b>2,729</b>
Water Tank Flash Rate	<b>3,794</b>	<b>3,794</b>
Water Tank Working Rate	<b>5,325</b>	<b>5,325</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>21,923</b>	<b>21,916</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROMERO T4N-R65W-S3 L02**

Consent Decree Tank System Number: **2057**

**Audit Notes**

AA - The final packet does not have a work request or job sheet.

CB - It appears that no Work Request Form or Job Sheet was provided because no work was required or performed. See page 2/16 of the Final Packet. The comments state "Current site configuration meets STEM requirements.". Additionally, the Facility Waldown/Start-up section states "not required".

CB - In the Equipment and Process tab the question "Is the number of separators that dump to the tanks correct?" has a value of "Unknown". In Noble's STEM evaluation the HP separator water leg is shown to dump to the tanks, the oil and water legs of the LP separator is shown to dump to the tanks. This configuration represents a reasonable maximum number of dumps and pressures configured to the tanks and controlled by the VCS. Therefore, no additional information is needed to confirm.

CB - In the Equipment and Process tab the question "Are truck loading vapor collection lines installed?" is answered "No". I changed the answer to "Yes" since both the signed evaluation and Noble's STEM Engineering Evaluation model indicate TLO is installed and accounted for in the PPVIFR.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROTH ST HOSHIKO T5N-R64W-S36 L01**

Consent Decree Tank System Number: **1198**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ROTH ST HOSHIKO T5N-R64W-S36 L01_FINAL PACKET	.pdf	5/21/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ROTH ST HOSHIKO T5N-R64W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	9/16/2016	STEM Engineering Evaluation Spreadsheet
ROTH ST HOSHIKO T5N-R64W-S36 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ROTH ST HOSHIKO T5N-R64W-S36 L01_FINAL PACKET	.pdf	5/21/2018	Work Request
ROTH ST HOSHIKO T5N-R64W-S36 L01_FINAL PACKET	.pdf	5/21/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ROTH ST HOSHIKO T5N-R64W-S36 L01_WALKDOWN	.pdf	9/7/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ROTH ST HOSHIKO T5N-R64W-S36 L01_IR VERIFICATION	.pdf	9/2/2016	IR Verification Field Data Sheet
ROTH ST HOSHIKO T5N-R64W-S36 L01_1458_NORMAL	.mp4	8/31/2016	IR Camera Video Normal Operations
ROTH ST HOSHIKO T5N-R64W-S36 L01_1459_DUMP	.mp4	8/31/2016	IR Camera Video During Dump Event
ROTH ST HOSHIKO T5N-R64W-S36 L01_1460_POST	.mp4	8/31/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ROTH ST HOSHIKO T5N-R64W-S36 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ROTH ST HOSHIKO T5N-R64W-S36 L01**

**Consent Decree Tank System Number:** **1198**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,812</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>523</b>	<b>523</b>	
Total VCS Capacity (scfh)	<b>4,335</b>	<b>5,076</b>	
VCS Capacity minus PPIVF (scfh)	<b>891</b>	<b>1,631</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/11/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROTH ST HOSHIKO T5N-R64W-S36 L01**

Consent Decree Tank System Number: **1198**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROTH ST HOSHIKO T5N-R64W-S36 L01**

Consent Decree Tank System Number: **1198**

**Audit Notes**

There is some conflicting data regarding the pressure setting of the HP separator. Pressure settings of 60 psig and 65 psig can be verified to have been used throughout the provided documentation. However, the work request asked for the pressure to be set at no higher than 60 psig, and there is documentation verifying the pressure setting at 60psig took place after the pressure setting at 65 psig, therefore it was decided to use 60 psig as the pressure setting for this evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ROTH T6N-R64W-S30 L03

**Consent Decree Tank System Number:** 277/2271

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_FINAL PACKET	.pdf	2/9/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_FINAL PACKET	.pdf	2/9/2016	Work Request
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_FINAL PACKET	.pdf	2/9/2016	Construction Jobsheets
2018 Draft Attachements to Comment Letter	.pdf	3/27/2020	Supplimental Completetion Documentation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_WALKDOWN	.pdf	2/9/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_0675_NORMAL	.pdf	2/8/2018	IR Verification Field Data Sheet
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_0676_DUMP	.mp4	2/8/2018	IR Camera Video Normal Operations
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_0677_POST	.mp4	2/8/2018	IR Camera Video During Dump Event
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_IR VERIFICATION	.mp4	2/9/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ROTH T6N-R64W-S30 L04 & ROTH T6N-R64W-S30 L03_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ROTH T6N-R64W-S30 L03**

**Consent Decree Tank System Number:** **277/2271**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,773</b>	<b>2,508</b>	
Total VCS Capacity (scfh)	<b>5,499</b>	<b>8,341</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,818</b>	<b>4,516</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 4/19/2018  
 Audit Document Review Verified by: Angela M. Oberlander and James Van Horne  
 Audit Document Verification Date: 10/12/2018 and 7/6/2020





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROTH T6N-R64W-S30 L03**

Consent Decree Tank System Number: **277/2271**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ROTH T6N-R64W-S30 L03**

Consent Decree Tank System Number: **277/2271**

**Audit Notes**

NEI Engineering Evaluation was completed with a maximum operating pressure of 60 psig. An e-mail from the automation group dated January 15, 2016 indicates the LP separator pressure switch was set to 70 psig. Noble provided additional data confirming the PSHH was set to 60 psi in response to the draft audit report.

The Work Request indicated the oil dump valves were to be modified with 1/2 inch trims. The dump valve size on the Roth A 30-7 (LP Separator) was a 2 inch valve. The Engineering Evaluation was completed with this valve as a 1 inch with a 1/2 inch trim. No documentation provided to confirm a change in the valve size (from 2 inch to 1 inch). Conservatively assumed the valve to be 2", the larger available size for 1/2 inch trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RUBIX JOHNSON QC T6N-R64W-S32 L01**  
 Consent Decree Tank System Number: **275**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RUBIX JOHNSON QC T6N-R64W-S32 L01_FINAL PACKET	.pdf	9/9/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RUBIX JOHNSON QC T6N-R64W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	1/12/2018	STEM Engineering Evaluation Spreadsheet
RUBIX JOHNSON QC T6N-R64W-S32 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RUBIX JOHNSON QC T6N-R64W-S32 L01_FINAL PACKET	.pdf	9/9/2015	Work Request
RUBIX JOHNSON QC T6N-R64W-S32 L01_FINAL PACKET	.pdf	9/9/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RUBIX JOHNSON QC T6N-R64W-S32 L01_WALKDOWN	.pdf	9/9/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RUBIX JOHNSON QC T6N-R64W-S32 L01_IR VERIFICATION	.pdf	9/8/2015	IR Verification Field Data Sheet
RUBIX JOHNSON QC T6N-R64W-S32 L01_0244_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
RUBIX JOHNSON QC T6N-R64W-S32 L01_0245_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
RUBIX JOHNSON QC T6N-R64W-S32 L01_0246_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RUBIX JOHNSON QC T6N-R64W-S32 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** RUBIX JOHNSON QC T6N-R64W-S32 L01

**Consent Decree Tank System Number:** 275

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,919</b>	<b>3,920</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,915</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>3,785</b>	<b>3,785</b>	
Total VCS Capacity (scfh)	<b>6,700</b>	<b>9,618</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,781</b>	<b>5,698</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 11/13/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RUBIX JOHNSON QC T6N-R64W-S32 L01**

Consent Decree Tank System Number: **275**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,920</b>	<b>3,919</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RUBIX JOHNSON QC T6N-R64W-S32 L01**

Consent Decree Tank System Number: **275**

**Audit Notes**

The walkdown checklist was not marked as being complete. Completion was verified through other documentation in the final packet.

Oil Dump Valve and Signed Eval: The Signed Evaluation document indicates a 1/2" trim valve. Noble's STEM Engineering Evaluation workbooks shows a 2" valve with 1/2" trim was used in their calculation. Documentation in the Final Packet indicates the oil dump valve on the LP separator is 1" with 1/2" trim. Noble's run using a 2" oil valve with 1/2" trim is conservative and the modeling guideline is still considered strictly followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RUFF NORTHRUP T4N-R64W-S8 L01**

Consent Decree Tank System Number: **628**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
RUFF NORTHRUP T4N-R64W-S8 L01_FINAL PACKET	.pdf	9/9/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
RUFF NORTHRUP T4N-R64W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	12/21/2017	STEM Engineering Evaluation Spreadsheet
RUFF NORTHRUP T4N-R64W-S8 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
RUFF NORTHRUP T4N-R64W-S8 L01_FINAL PACKET	.pdf	9/9/2015	Work Request
RUFF NORTHRUP T4N-R64W-S8 L01_FINAL PACKET	.pdf	9/9/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
RUFF NORTHRUP T4N-R64W-S8 L01_WALKDOWN	.pdf	9/9/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
RUFF NORTHRUP T4N-R64W-S8 L01_IR VERIFICATION	.pdf	9/8/2015	IR Verification Field Data Sheet
RUFF NORTHRUP T4N-R64W-S8 L01_0185_NORMAL	.mp4	9/1/2015	IR Camera Video Normal Operations
RUFF NORTHRUP T4N-R64W-S8 L01_0185_DUMP	.mp4	9/1/2015	IR Camera Video During Dump Event
RUFF NORTHRUP T4N-R64W-S8 L01_0185_POST	.mp4	9/1/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
RUFF NORTHRUP T4N-R64W-S8 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **RUFF NORTHRUP T4N-R64W-S8 L01**

**Consent Decree Tank System Number:** **628**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>14,929</b>	<b>14,932</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,176</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>92,217</b>	<b>92,217</b>	
Total VCS Capacity (scfh)	<b>98,393</b>	<b>102,650</b>	
VCS Capacity minus PPIVF (scfh)	<b>83,464</b>	<b>87,719</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RUFF NORTHRUP T4N-R64W-S8 L01**

Consent Decree Tank System Number: **628**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2312							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	241.5							
Working Flow (Mscfd) <sup>h,i</sup>	22							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	34	0

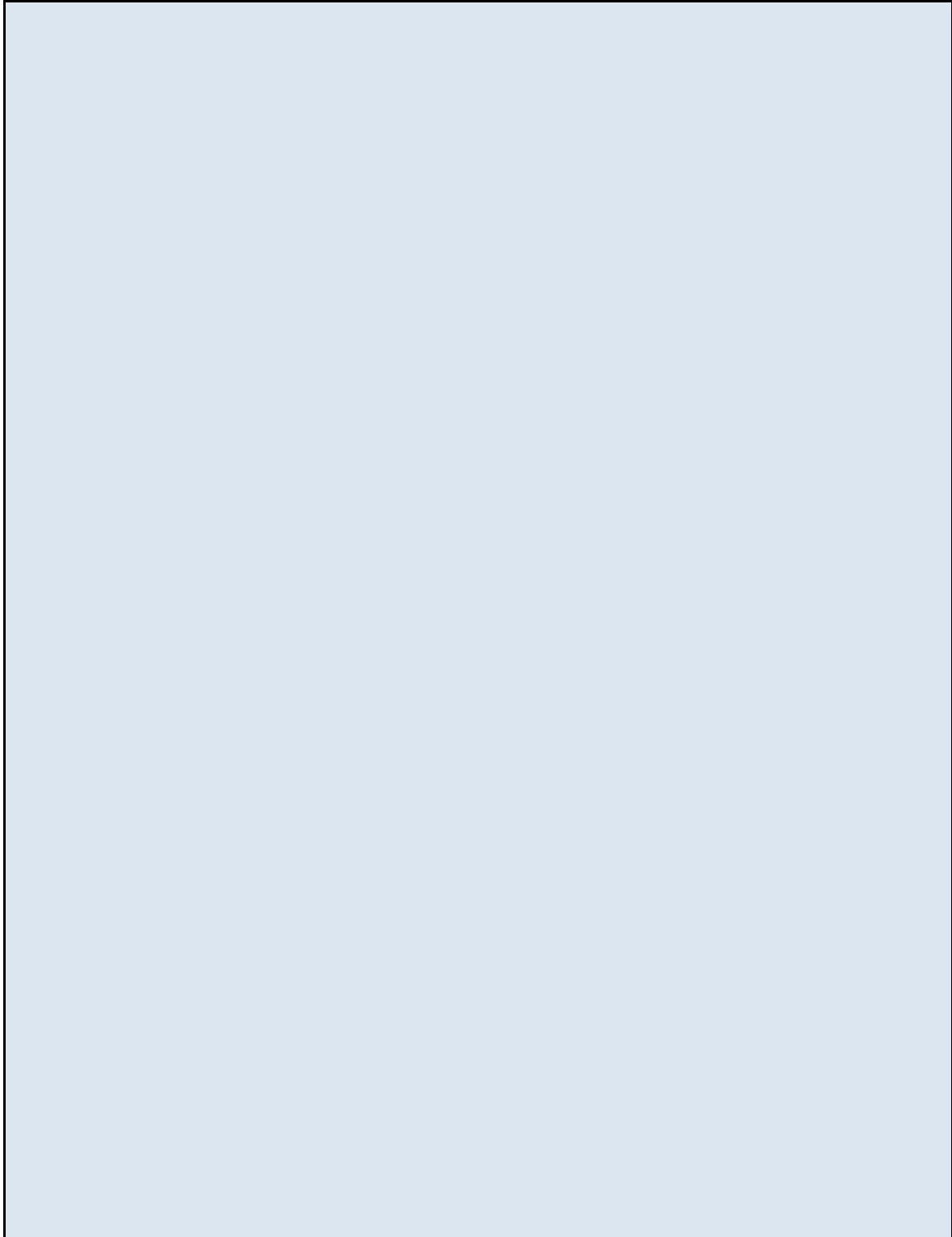
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	10,062	10,062
Oil Tank Working Rate	916	914
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	2,527	2,527
Total	14,932	14,929

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RUFF NORTHRUP T4N-R64W-S8 L01**

Consent Decree Tank System Number: **628**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RURAL T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2277**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
RURAL T4N-R65W-S31 L01_FINAL PACKET	.pdf	9/29/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
RURAL T4N-R65W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	5/27/2016	STEM Engineering Evaluation Spreadsheet
RURAL T4N-R65W-S31 L01_SIGNED EVAL	.pdf	5/31/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
RURAL T4N-R65W-S31 L01_FINAL PACKET	.pdf	9/29/2017	Work Request
RURAL T4N-R65W-S31 L01_FINAL PACKET	.pdf	9/29/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
RURAL T4N-R65W-S31 L01_WALKDOWN	.pdf	5/20/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
RURAL T4N-R65W-S31 L01_IR VERIFICATION	.pdf	5/19/2016	IR Verification Field Data Sheet
RURAL T4N-R65W-S31 L01_1062_NORMAL	.mp4	5/18/2016	IR Camera Video Normal Operations
RURAL T4N-R65W-S31 L01_1063_DUMP	.mp4	5/18/2016	IR Camera Video During Dump Event
RURAL T4N-R65W-S31 L01_1064_POST	.mp4	5/18/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
RURAL T4N-R65W-S31 L01_SIGNED EVAL	.pdf	5/31/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **RURAL T4N-R65W-S31 L01**

**Consent Decree Tank System Number:** **2277**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,541</b>	<b>9,139</b>	<b>7%</b>
Calculated Burner Capacity (scfh)	<b>2,957</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>11,621</b>	<b>24,259</b>	
Total VCS Capacity (scfh)	<b>14,578</b>	<b>29,217</b>	
VCS Capacity minus PPIVF (scfh)	<b>6,037</b>	<b>20,078</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/19/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/2/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RURAL T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2277**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78	0.78						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>l</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	475
Truck Loading Vapor	0	0
Total	9,139	8,541

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RURAL T4N-R65W-S31 L01**

Consent Decree Tank System Number: **2277**

**Audit Notes**

The Walkdown Checklist (RURAL T4N-R65W-S31 L01\_WALKDOWN.pdf, pg. 4) was not marked as being complete. Completion of the Work Request was verified through other documentation in the Final Packet.

The signed evaluation (RURAL T4N-R65W-S31 L01\_SIGNED EVAL, p 2) states the fill level was 68%. It also states that 1 of the 3 tanks was "disconnected from fill header to be used as headspace only." The fill max should be set to 60% instead of 68%. The STEM model was run at 60% in the final packet and 68% in the STEM model in the final packet (RURAL T4N-R65W-S31 L01\_FINAL PACKET, p 11). The engineering design standard was still strictly followed since the evaluation underestimated actual headspace surge capacity.

The field data sheet (RURAL T4N-R65W-S31 L01\_FINAL PACKET, pg 15) does not show the valve or trim size for Separator 2, the new LP separator. A1 of the walkdown checklist (RURAL T4N-R65W-S31 L01\_WALKDOWN) confirms the trim to be 1/2. A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

The site was selected for an additional IR Camera inspection because the camera panned over the site very quickly, making it difficult for visual inspection.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01**

Consent Decree Tank System Number: **166**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_FINAL PACKET	.pdf	1/5/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	1/12/2018	STEM Engineering Evaluation Spreadsheet
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_FINAL PACKET	.pdf	1/5/2018	Work Request
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_FINAL PACKET	.pdf	1/5/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_WALKDOWN	.pdf	1/5/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_IR VERIFICATION	.pdf	1/5/2018	IR Verification Field Data Sheet
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_1398_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_1399_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_1400_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01_SIGNED EVAL	.pdf	1/19/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01**

**Consent Decree Tank System Number:** **166**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,953</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>600</b>	<b>600</b>	
Total VCS Capacity (scfh)	<b>4,553</b>	<b>5,558</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,109</b>	<b>2,114</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 11/13/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01**

Consent Decree Tank System Number: **166**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **RURAL UPRR PAN AM BREST GARDNER T4N-R65W-S31 L01**

Consent Decree Tank System Number: **166**

**Audit Notes**

The walkdown checklist was not marked as being complete. Completion was verified through other documentation in the final packet.

The STEM Work Request Form on page 3 of the Final Packet asked that LP oil dump valve trims be confirmed to be 1/2". There is no confirmation in the Job Sheet on page 21 of the Final Packet. Item A1 of the Walkdown Checklist form indicates that all oil dump valve trim sizes are consistent with the design.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SANDAU BARTLES T4N-R66W-S25 L02**

Consent Decree Tank System Number: **163**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
052_SANDAU BARTLES T4N-R66W-S25 L02 Facility Walkdown	.pdf	2/3/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SANDAU BARTLES T4N-R66W-S25 L02_STEM Engineering Evaluation_rev1	.xlsm	3/21/2017	STEM Engineering Evaluation Spreadsheet
SANDAU BARTLES T4N-R66W-S25 L02_SIGNED EVAL	.pdf	3/21/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SANDAU BARTLES T4N-R66W-S25 L02_FINAL PACKET	.pdf	3/1/2016	Work Request
SANDAU BARTLES T4N-R66W-S25 L02_FINAL PACKET	.pdf	2/15/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SANDAU BARTLES T4N-R66W-S25 L02_FINAL PACKET	.pdf	3/17/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SANDAU BARTLES T4N-R66W-S25 L02_IR VERIFICATION	.pdf	3/17/2017	IR Verification Field Data Sheet
SANDAU BARTLES T4N-R66W-S25 L02_1868_NORMAL	.mp4	3/17/2017	IR Camera Video Normal Operations
SANDAU BARTLES T4N-R66W-S25 L02_1869_DUMP	.mp4	3/17/2017	IR Camera Video During Dump Event
SANDAU BARTLES T4N-R66W-S25 L02_1870_POST	.mp4	3/17/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SANDAU BARTLES T4N-R66W-S25 L02_SIGNED EVAL	.pdf	3/21/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SANDAU BARTLES T4N-R66W-S25 L02

**Consent Decree Tank System Number:** 163

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,244</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>20,578</b>	<b>20,578</b>	
Total VCS Capacity (scfh)	<b>23,303</b>	<b>25,536</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,221</b>	<b>21,293</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SANDAU BARTLES T4N-R66W-S25 L02**

Consent Decree Tank System Number: **163**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,454</b>	<b>3,307</b>
Oil Tank Working Rate	<b>314</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,244</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SANDAU BARTLES T4N-R66W-S25 L02**

Consent Decree Tank System Number: **163**

**Audit Notes**

Signed evaluation (SANDAU BARTLES T4N-R66W-S25 L02\_SIGNED EVAL, p. 2) indicates use of a Leed 48" Gen 1 #7 combustor but work request (SANDAU BARTLES T4N-R66W-S25 L02\_FINAL PACKET.pdf, p. 3) shows a Leed EC48-2S. Conservatively assumed a Leed EC48-2S is installed.

Work request (SANDAU BARTLES T4N-R66W-S25 L02\_FINAL PACKET.pdf, p. 3) and QC Stem Checkout (SANDAU BARTLES T4N-R66W-S25 L02\_FINAL PACKET.pdf, p. 22) indicate that separator PSHH is set to 65 psig but jobsheet (SANDAU BARTLES T4N-R66W-S25 L02\_FINAL PACKET.pdf, p. 17) shows PSHH installed at 55 psig. Assuming separator was set at 65 psig.

NEI Evaluation was completed with one of the two tanks out of service as additional headspace. The jobsheet indicates the tank was disabled from receiving liquids while remaining connected to the VCS, but the walkdown checklist indicates all tanks are capable of receiving liquid production. Need verification whether tank is vapor service only or capable of receiving production liquids.

NEI Data Request Response:

Field verification for this facility was completed on or around 2/16/17, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).

The Work Request indicated the oil dump valve on HPLP Separator was to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SANDAU T4N-R66W-S21 L01**

Consent Decree Tank System Number: **185**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SANDAU T4N-R66W-S21 L01_FINAL PACKET	.pdf	8/8/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SANDAU T4N-R66W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	8/8/2017	STEM Engineering Evaluation Spreadsheet
SANDAU T4N-R66W-S21 L01_SIGNED EVAL	.pdf	8/8/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SANDAU T4N-R66W-S21 L01_FINAL PACKET	.pdf	8/8/2017	Work Request
SANDAU T4N-R66W-S21 L01_FINAL PACKET	.pdf	8/8/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SANDAU T4N-R66W-S21 L01_WALKDOWN	.pdf	8/7/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SANDAU T4N-R66W-S21 L01_IR VERIFICATION	.pdf	8/7/2017	IR Verification Field Data Sheet
SANDAU T4N-R66W-S21 L01_2228_NORMAL	.mp4	8/7/2017	IR Camera Video Normal Operations
SANDAU T4N-R66W-S21 L01_2229_DUMP	.mp4	8/7/2017	IR Camera Video During Dump Event
SANDAU T4N-R66W-S21 L01_2230_POST	.mp4	8/7/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SANDAU T4N-R66W-S21 L01_SIGNED EVAL	.pdf	8/8/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SANDAU T4N-R66W-S21 L01**

Consent Decree Tank System Number: **185**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,510</b>	<b>2,510</b>	
Total VCS Capacity (scfh)	<b>6,062</b>	<b>7,110</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,980</b>	<b>3,027</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/6/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/21/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SANDAU T4N-R66W-S21 L01**

Consent Decree Tank System Number: **185**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	4,083	4,082

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SANDAU T4N-R66W-S21 L01**

Consent Decree Tank System Number: **185**

**Audit Notes**

No comments, all documentation is consistent with Modeling Guideline, Engineering Design Standard, and itself.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SARCHET T3N-R65W-S24 L02**

Consent Decree Tank System Number: **1935**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SARCHET T3N-R65W-S24 L02_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SARCHET T3N-R65W-S24 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SARCHET T3N-R65W-S24 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SARCHET T3N-R65W-S24 L02_FINAL PACKET	.pdf	7/11/2018	Work Request
SARCHET T3N-R65W-S24 L02_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SARCHET T3N-R65W-S24 L02_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist
2018 Draft Attachments to Comment Letter	.pdf	3/27/2020	Supplimental Walkdown Documentation

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SARCHET T3N-R65W-S24 L02_IR VERIFICATION UPDATED	.pdf	7/11/2018	IR Verification Field Data Sheet
SARCHET T3N-R65W-S24 L02_0006_NORMAL UPDATED	.mp4	7/11/2018	IR Camera Video Normal Operations
SARCHET T3N-R65W-S24 L02_0007_DUMP UPDATED	.mp4	7/11/2018	IR Camera Video During Dump Event
SARCHET T3N-R65W-S24 L02_0901_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SARCHET T3N-R65W-S24 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SARCHET T3N-R65W-S24 L02**

Consent Decree Tank System Number: **1935**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,273</b>	<b>7,453</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>22,826</b>	<b>22,826</b>	
Total VCS Capacity (scfh)	<b>25,742</b>	<b>28,659</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,469</b>	<b>21,206</b>	

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: Chris Boggess and James Van Horne  
 Audit Document Verification Date: 8/10/2018 and 8/3/2020



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SARCHET T3N-R65W-S24 L02**

Consent Decree Tank System Number: **1935**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>l</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,453</b>	<b>7,273</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SARCHET T3N-R65W-S24 L02**

Consent Decree Tank System Number: **1935**

### Audit Notes

While the field data sheets verify the size of the dump and trim to be 2" & 1", respectively, the site, according to the signed eval and stem engineering design verify the site was modeled with a 1" dump valve with 1/2" trim. While the documented data is conflicting it is safe to say the site evaluation is fine as is with SLR modeling the site with a 2" dump and 1" trim, the PPIVF is still well below the total VCS capacity. Noble provided additional information in a letter dated 3/27/2020 that confirms the dump valve trim size to be 1/2". the valve size in the engineering evaluation still differs from the field data sheets.

Valve on site is larger than in Evaluation. Noble underestimated PPIVFR, Modeling Guideline not followed, but VCS capacity is adequate.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R63W-S18 L01**

Consent Decree Tank System Number: **2374**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S18 L01_FINAL PACKET	.pdf	5/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	7/14/2017	STEM Engineering Evaluation Spreadsheet
SATER T4N-R63W-S18 L01_SIGNED EVAL	.pdf	7/20/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S18 L01_FINAL PACKET	.pdf	5/26/2016	Work Request
SATER T4N-R63W-S18 L01_FINAL PACKET	.pdf	5/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S18 L01_WALKDOWN	.pdf	5/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S18 L01_IR VERIFICATION	.pdf	6/26/2016	IR Verification Field Data Sheet
SATER T4N-R63W-S18 L01_1080_NORMAL	.mp4	6/25/2016	IR Camera Video Normal Operations
SATER T4N-R63W-S18 L01_1081_DUMP	.mp4	6/25/2016	IR Camera Video During Dump Event
SATER T4N-R63W-S18 L01_1083_POST	.mp4	6/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S18 L01_SIGNED EVAL	.pdf	7/20/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SATER T4N-R63W-S18 L01**

**Consent Decree Tank System Number:** **2374**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>3</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>70</b>	<b>70</b>	<b>70</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>	
Number of Units	<b>1</b>	<b>1</b>	<b>1</b>	
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>	<b>140</b>	

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>25,497</b>	<b>26,932</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>7,735</b>	<b>17,500</b>	
Headspace Surge Capacity (scfh)	<b>35,504</b>	<b>51,924</b>	
Total VCS Capacity (scfh)	<b>43,239</b>	<b>69,424</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,742</b>	<b>42,492</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser

Audit Document Review Date: 11/17/2017

Audit Document Review Verified by: Angela M. Oberlander

Audit Document Verification Date: 12/27/2017





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R63W-S18 L01**

Consent Decree Tank System Number: **2374**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	-0.90	-0.90	-0.90					
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	0.77	0.77	0.77					
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25					
Critical Pressure (psia) <sup>b</sup>	539	539	539					
Vapor Pressure (psia) <sup>c</sup>	83	83	83					
Critical pressure ratio ( $F_p$ ) <sup>d</sup>	0.85	0.85	0.85					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	2409	2409	2409					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	55.2	55.2	55.2					
Working Flow (Mscfd) <sup>h,i</sup>	23	23	23					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	0.80	0.80	0.80	0.80	0.80	0.80		
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20	12.20	12.20	12.20	12.20	12.20		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_p$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	6789	6789	6789	3023	3023	3023		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	27	27	27	12	12	12		
Working Flow (Mscfd) <sup>l</sup>	38	38	38	17	17	17		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>j</sup>	238	238
Mscfd	51	17

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,897	6,897
Oil Tank Working Rate	2,864	2,857
Water Tank Flash Rate	4,906	4,905
Water Tank Working Rate	6,886	6,885
Tank Breathing Rate	2,853	1,426
Truck Loading Vapor	2,527	2,527
Total	26,932	25,497

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R63W-S18 L01**

Consent Decree Tank System Number: **2374**

**Audit Notes**

Tanks are in a banked configuration. Noble calculations do not account for breathing from non-producing bank. Modified audit spreadsheet to accommodate a banked configuration for breathing losses and surge capacity for one bank of 6-300 bbl oil tanks and one bank of 3-300 bbl oil tanks and 3-300 bbl water tanks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R63W-S19 L01**

Consent Decree Tank System Number: **1396**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S19 L01_FINAL PACKET	.pdf	4/18/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	9/23/2016	STEM Engineering Evaluation Spreadsheet
SATER T4N-R63W-S19 L01_SIGNED EVAL	.pdf	9/26/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S19 L01_FINAL PACKET	.pdf	6/10/2016	Work Request
SATER T4N-R63W-S19 L01_FINAL PACKET	.pdf	7/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S19 L01_FINAL PACKET	.pdf	8/31/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S19 L01_FINAL PACKET	.pdf	8/31/2016	IR Verification Field Data Sheet
SATER T4N-R63W-S19 L01_1455_NORMAL	.mp4	8/31/2016	IR Camera Video Normal Operations
SATER T4N-R63W-S19 L01_1456_DUMP	.mp4	8/31/2016	IR Camera Video During Dump Event
SATER T4N-R63W-S19 L01_1457_POST	.mp4	8/31/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R63W-S19 L01_SIGNED EVAL	.pdf	9/26/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SATER T4N-R63W-S19 L01**

**Consent Decree Tank System Number:** **1396**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>20,287</b>	<b>1,293</b>	
Total VCS Capacity (scfh)	<b>24,055</b>	<b>5,893</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,547</b>	<b>1,204</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 4/4/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R63W-S19 L01**

Consent Decree Tank System Number: **1396**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,689</b>	<b>4,508</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R63W-S19 L01**

Consent Decree Tank System Number: **1396**

### Audit Notes

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

#### NEI Data Request Response:

Field verification for this facility was completed on or around 7/22/16, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).

Possible emissions from PRV at ~1:10 in Normal IR video (SATER T4N-R63W-S19 L01\_1455\_NORMAL).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R64W-S23 L01**

Consent Decree Tank System Number: **506**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SATER T4N-R64W-S23 L01_FINAL PACKET	.pdf	5/30/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R64W-S23 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
SATER T4N-R64W-S23 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R64W-S23 L01_FINAL PACKET	.pdf	5/30/2016	Work Request
SATER T4N-R64W-S23 L01_FINAL PACKET	.pdf	5/30/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R64W-S23 L01_WALKDOWN	.pdf	5/30/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R64W-S23 L01_IR VERIFICATION	.pdf	5/27/2016	IR Verification Field Data Sheet
SATER T4N-R64W-S23 L01_1087_NORMAL	.mp4	5/26/2016	IR Camera Video Normal Operations
SATER T4N-R64W-S23 L01_1088_DUMP	.mp4	5/26/2016	IR Camera Video During Dump Event
SATER T4N-R64W-S23 L01_1089_POST	.mp4	5/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SATER T4N-R64W-S23 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SATER T4N-R64W-S23 L01**

**Consent Decree Tank System Number:** **506**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>12</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>4</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>				

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>	<b>LEED EC48-2S</b>	<b>LEED EC48-2S</b>	
Number of Units	<b>1</b>	<b>1</b>	<b>1</b>	
Man. Capacity (MSCFD)	<b>119</b>	<b>119</b>	<b>119</b>	

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>54,230</b>	<b>54,240</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>10,912</b>	<b>14,875</b>	
Headspace Surge Capacity (scfh)	<b>151,814</b>	<b>151,814</b>	
Total VCS Capacity (scfh)	<b>162,726</b>	<b>166,689</b>	
VCS Capacity minus PPIVF (scfh)	<b>108,496</b>	<b>112,449</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 1/3/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 3/2/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R64W-S23 L01**

Consent Decree Tank System Number: **506**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61	0.61	0.61	0.61				
Z2	-0.86	-0.86	-0.86	-0.86				
Z3	0.98	0.98	0.98	0.98				
Z	0.72	0.72	0.72	0.72				
Gas/Oil Ratio (scf/bbl)	96.4	96.4	96.4	96.4				

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77	0.77	0.77	0.77				
Valve Coefficient (gpm/psi) (C)	21.25	21.25	21.25	21.25				
Critical Pressure (psia) <sup>b</sup>	530	530	530	530				
Vapor Pressure (psia) <sup>c</sup>	73	73	73	73				
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86	0.86	0.86	0.86				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bopd) <sup>f,g</sup>	2213	2213	2213	2213				

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	213.2	213.2	213.2	213.2				
Working Flow (Mscfd) <sup>h,i</sup>	21	21	21	21				

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Valve Coefficient (gpm/psi) (C)	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200	3200	3200
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1	1	1
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak Flow (bwpd) <sup>f,g</sup>	3906	3906	3906	3906	1629	1629	1629	1629

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	16	16	16	16	7	7	7	7
Working Flow (Mscfd) <sup>l</sup>	22	22	22	22	9	9	9	9

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	68	23

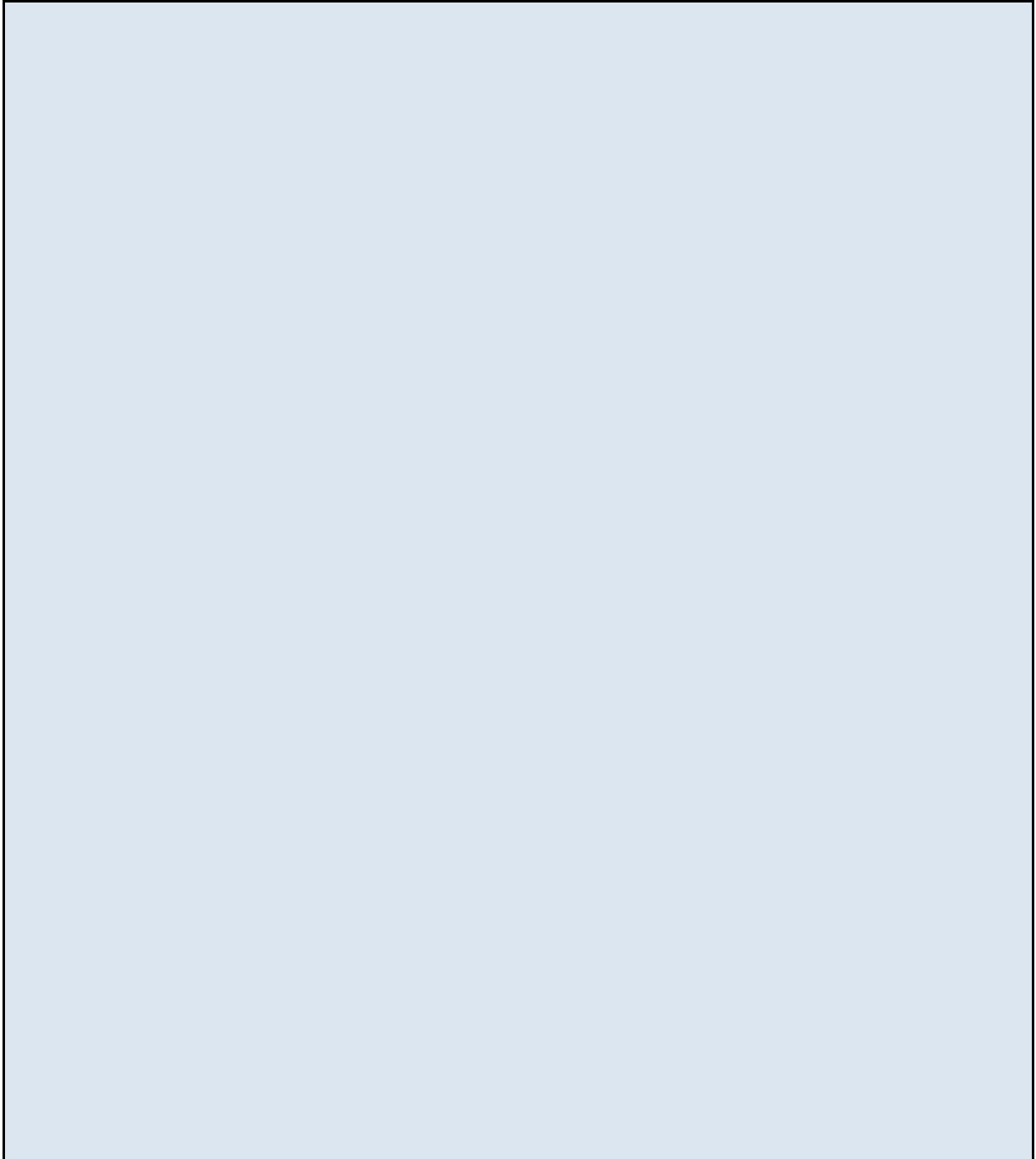
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	35,532	35,532
Oil Tank Working Rate	3,507	3,498
Water Tank Flash Rate	3,690	3,690
Water Tank Working Rate	5,180	5,179
Tank Breathing Rate	3,804	3,804
Truck Loading Vapor	2,527	2,527
Total	54,240	54,230

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER T4N-R64W-S23 L01**

Consent Decree Tank System Number: **506**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER USX T4N-R63W-S19 L01**

Consent Decree Tank System Number: **1465**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SATER USX T4N-R63W-S19 L01_FINAL PACKET	.pdf	5/31/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SATER USX T4N-R63W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	5/27/2016	STEM Engineering Evaluation Spreadsheet
SATER USX T4N-R63W-S19 L01_SIGNED EVAL	.pdf	5/31/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SATER USX T4N-R63W-S19 L01_FINAL PACKET	.pdf	2/4/2016	Work Request
SATER USX T4N-R63W-S19 L01_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SATER USX T4N-R63W-S19 L01_FINAL PACKET	.pdf	5/25/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SATER USX T4N-R63W-S19 L01_FINAL PACKET	.pdf	5/25/2016	IR Verification Field Data Sheet
SATER USX T4N-R63W-S19 L01_1084_NORMAL	.mp4	5/25/2016	IR Camera Video Normal Operations
SATER USX T4N-R63W-S19 L01_1085_DUMP	.mp4	5/25/2016	IR Camera Video During Dump Event
SATER USX T4N-R63W-S19 L01_1086_POST	.mp4	5/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SATER USX T4N-R63W-S19 L01_SIGNED EVAL	.pdf	5/31/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER USX T4N-R63W-S19 L01**

Consent Decree Tank System Number: **1465**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,271</b>	<b>4,509</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>8,823</b>	<b>20,015</b>	
Total VCS Capacity (scfh)	<b>13,043</b>	<b>24,615</b>	
VCS Capacity minus PPIVF (scfh)	<b>8,772</b>	<b>20,106</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 4/4/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/11/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER USX T4N-R63W-S19 L01**

Consent Decree Tank System Number: **1465**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,271</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SATER USX T4N-R63W-S19 L01**

Consent Decree Tank System Number: **1465**

**Audit Notes**

Tank burner size not confirmed in documentation. Assuming 48" size which is typical of Noble facilities and consistent with Signed Evaluation.

No confirmation that tank 1 was taken out of liquid service to be used as a vapor headspace tank.

Noble's response: Field verification for this facility was completed on or around 7/22/16, field verification confirmed that one tank was converted into a headspace tank (i.e. removed from liquid service but remained connected to vapor header).

Field data sheets indicate only one of the two oil tanks is connected to the VCS. If this is the case, one tank can not be utilized as headspace as it is not connected to the VCS. Need to confirm whether or not the tank is connected to the VCS system.

Noble's response to data request: An engineering review of this facility was completed on or around 5/17/2018, this review confirmed that stock tank no. 2 is connected to the VOC System.

The Engineering Evaluation was completed with one (1) 300 bbl oil tank limited to 45% full. Confirmation is needed on control methods for limiting a single oil tank to 45% capacity, if indeed only one tank is connected to the VCS.

Noble's response to data request: An engineering review of this facility was completed on or around 7/12/2018, this review confirmed that stock tank no. 1 is a headspace tank and therefore limits stock tank no. 2 to 45% capacity. The initial walkdown showed stock tank no. 2 was disconnected from the vapor control system. The work request states to turn stock tank no. 2 into a headspace tank, however stock tank no. 1 was converted into the headspace tank. Stock tank no. 2 was reconnected to the vapor control system and is producing and stock tank no. 1 is the headspace tank.

The Modeling Guidelines has not been strictly applied because the breathing losses have not been fully captured in the PPIVFR as the Engineering Evaluation was completed with 1 tank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: SAUER T5N-R65W-S33 L02

Consent Decree Tank System Number: 2031

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L02_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SAUER T5N-R65W-S33 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L02_FINAL PACKET	.pdf	7/11/2018	Work Request
SAUER T5N-R65W-S33 L02_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L02_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L02_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SAUER T5N-R65W-S33 L02_0932_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SAUER T5N-R65W-S33 L02_0933_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SAUER T5N-R65W-S33 L02_0934_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SAUER T5N-R65W-S33 L02**

Consent Decree Tank System Number: **2031**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>12</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>4</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>		

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9	Vessel 10	Vessel 11	Vessel 12
Max Operating Pressure (psig)	<b>400</b>	<b>70</b>	<b>400</b>	<b>70</b>	<b>400</b>	<b>70</b>	<b>400</b>	<b>70</b>	<b>400</b>	<b>70</b>	<b>400</b>	<b>70</b>
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig) **12**

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>Cimarron 48 HV</b>	<b>Cimarron 48 HV</b>	
Number of Units	<b>1</b>	<b>1</b>	<b>1</b>	
Man. Capacity (MSCFD)	<b>109.272</b>	<b>109.272</b>	<b>109.272</b>	

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>31,988</b>	<b>41,891</b>	<b>31%</b>
Calculated Burner Capacity (scfh)	<b>8,419</b>	<b>13,659</b>	
Headspace Surge Capacity (scfh)	<b>67,882</b>	<b>72,789</b>	
Total VCS Capacity (scfh)	<b>76,301</b>	<b>86,448</b>	
VCS Capacity minus PPIVF (scfh)	<b>44,313</b>	<b>44,557</b>	

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff

Audit Document Review Date: 7/24/2018

Audit Document Review Verified by: Chris Boggess

Audit Document Verification Date: 11/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SAUER T5N-R65W-S33 L02**

Consent Decree Tank System Number: **2031**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02		
Z2	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86		
Z3	0.98	0.98	0.98	0.98	0.98	0.98		
Z	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90		
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9	22.9	22.9	22.9		

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77	0.77	0.77		
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25		
Critical Pressure (psia) <sup>b</sup>	539	539	539	539	539	539		
Vapor Pressure (psia) <sup>c</sup>	83	83	83	83	83	83		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85	0.85	0.85	0.85	0.85		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bopd) <sup>f,g</sup>	2409	2409	2409	2409	2409	2409		

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	55.2	55.2	55.2	55.2	55.2	55.2		
Working Flow (Mscfd) <sup>h,i</sup>	23	23	23	23	23	23		

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78	0.78	0.78	0.78	0.78	0.94	0.78	0.78
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20	7.20	7.20	7.20	5.72	7.20	7.20
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200	3200	3200	3200
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1	1	1	1
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak Flow (bwpd) <sup>f,g</sup>	3906	1739	3906	1739	3906	1739	3740	1739	3906

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8	Vessel 9
Flash Flow (Mscfd)	16	7	16	7	16	7	15	7	16
Working Flow (Mscfd) <sup>l</sup>	22	10	22	10	22	10	21	10	22

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>i</sup>	396	396
Mscfd	114	38

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	13,793	13,793
Oil Tank Working Rate	5,727	5,713
Water Tank Flash Rate	5,618	2,823
Water Tank Working Rate	7,886	3,962
Tank Breathing Rate	6,340	3,170
Truck Loading Vapor	2,527	2,527
Total	41,891	31,988

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: SAUER T5N-R65W-S33 L02

Consent Decree Tank System Number: 2031

**Audit Notes**

The separator pneumatic PSHH is set by the operator not automation and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 70 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

Noble did not account for banked tanks in Engineering Evaluation spreadsheet.

The Engineering Evaluation is completed with "doubled-up" entries for the HP water, and LP water dump rates. The peak dump rates correspond to a single separator dump rate and not rate which is "doubled-up" as indicated on the Certification Report. Because the peak dump rates are underestimated, the Modeling Guideline has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: SAUER T5N-R65W-S33 L03

Consent Decree Tank System Number: 266

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L03_FINAL PACKET	.pdf	3/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L03_STEM Engineering Evaluation_rev1	.xls	3/30/2016	STEM Engineering Evaluation Spreadsheet
SAUER T5N-R65W-S33 L03_SIGNED EVAL	.pdf	3/30/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L03_FINAL PACKET	.pdf	1/22/2016	Work Request
SAUER T5N-R65W-S33 L03_FINAL PACKET	.pdf	3/14/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L03_WALKDOWN	.pdf	3/28/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L03_IR VERIFICATION	.pdf	3/28/2016	IR Verification Field Data Sheet
SAUER T5N-R65W-S33 L03_0796_NORMAL	.mp4	3/28/2016	IR Camera Video Normal Operations
SAUER T5N-R65W-S33 L03_0797_DUMP	.mp4	3/28/2016	IR Camera Video During Dump Event
SAUER T5N-R65W-S33 L03_0798_POST	.mp4	3/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SAUER T5N-R65W-S33 L03_SIGNED EVAL	.pdf	3/30/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: SAUER T5N-R65W-S33 L03

Consent Decree Tank System Number: 266

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	5
Oil Tank Capacity (bbl):	300
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7	LEED 48" Gen 1 #7		
Number of Units	1	1		
Man. Capacity (MSCFD)	140	140		

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	5,222	5,222	0%
Calculated Burner Capacity (scfh)	5,247	11,667	
Headspace Surge Capacity (scfh)	26,806	26,806	
Total VCS Capacity (scfh)	32,053	38,473	
VCS Capacity minus PPIVF (scfh)	26,831	33,250	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 7/23/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SAUER T5N-R65W-S33 L03**

Consent Decree Tank System Number: **266**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>29</b>	

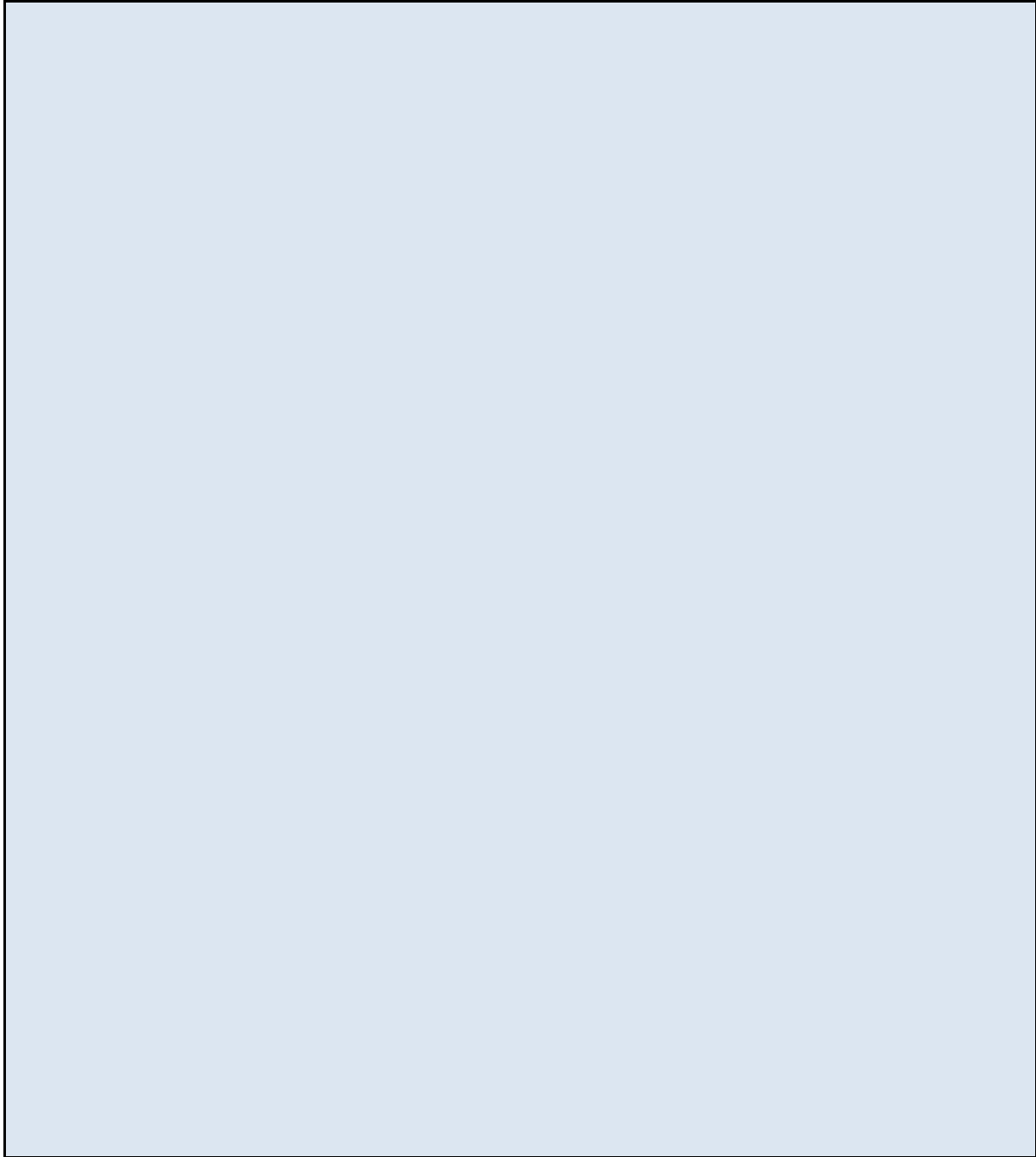
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,222</b>	<b>5,222</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: SAUER T5N-R65W-S33 L03

Consent Decree Tank System Number: 266

**Audit Notes**

A large, empty rectangular box with a light blue background and a black border, intended for entering audit notes. The box is currently blank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHAEFER DINNER T4N-R66W-S13 L01**

Consent Decree Tank System Number: **839**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHAEFER DINNER T4N-R66W-S13 L01_FINAL PACKET	.pdf	11/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHAEFER DINNER T4N-R66W-S13 L01_STEM Engineering Evaluation_rev1	.xlsm	12/2/2016	STEM Engineering Evaluation Spreadsheet
SCHAEFER DINNER T4N-R66W-S13 L01_SIGNED EVAL	.pdf	12/12/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHAEFER DINNER T4N-R66W-S13 L01_FINAL PACKET	.pdf	11/11/2016	Work Request
SCHAEFER DINNER T4N-R66W-S13 L01_FINAL PACKET	.pdf	11/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHAEFER DINNER T4N-R66W-S13 L01_WALKDOWN	.pdf	11/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHAEFER DINNER T4N-R66W-S13 L01_IR VERIFICATION	.pdf	11/8/2016	IR Verification Field Data Sheet
SCHAEFER DINNER T4N-R66W-S13 L01_0354_NORMAL	.mp4	11/7/2016	IR Camera Video Normal Operations
SCHAEFER DINNER T4N-R66W-S13 L01_0355_DUMP	.mp4	11/7/2016	IR Camera Video During Dump Event
SCHAEFER DINNER T4N-R66W-S13 L01_0356_POST	.mp4	11/7/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHAEFER DINNER T4N-R66W-S13 L01_SIGNED EVAL	.pdf	12/12/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHAEFER DINNER T4N-R66W-S13 L01**

Consent Decree Tank System Number: **839**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>380</b>	<b>380</b>	
Total VCS Capacity (scfh)	<b>4,148</b>	<b>4,980</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,080</b>	<b>1,785</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/19/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/2/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHAEFER DINNER T4N-R66W-S13 L01**

Consent Decree Tank System Number: **839**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHAEFER DINNER T4N-R66W-S13 L01**

Consent Decree Tank System Number: **839**

**Audit Notes**

The Walkdown Checklist (SCHAEFER DINNER T4N-R66W-S13 L01\_WALKDOWN.pdf, pg. 4) did not indicate if all the items on the Work Request form had been completed. Completion of the Work Request was verified through other documentation in the Final Packet.

The Work request in the final packet requests that the dump valve get replaced with a 1" valve and a 1/2" trim. (SCHAEFER DINNER T4N-R66W-S13 L01\_FINAL PACKET, p 3). The job sheet states that the trim was replaced to be 1/2", but there was no documentation proving the valve was changed from 2" to 1" (SCHAEFER DINNER T4N-R66W-S13 L01\_FINAL PACKET, p 35) . A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

This site was selected for an additional IR Camera inspection because the original footage was dark, shaky, and at some points, blurry.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S19 L03**

Consent Decree Tank System Number: **833**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S19 L03_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S19 L03_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SCHMIDT T4N-R65W-S19 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S19 L03_FINAL PACKET	.pdf	7/11/2018	Work Request
SCHMIDT T4N-R65W-S19 L03_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S19 L03_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S19 L03_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SCHMIDT T4N-R65W-S19 L03_1925_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SCHMIDT T4N-R65W-S19 L03_1926_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SCHMIDT T4N-R65W-S19 L03_1927_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S19 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SCHMIDT T4N-R65W-S19 L03

**Consent Decree Tank System Number:** 833

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,068	3,069	0%
Calculated Burner Capacity (scfh)	4,027	4,958	
Headspace Surge Capacity (scfh)	356	356	
Total VCS Capacity (scfh)	4,383	5,314	
VCS Capacity minus PPIVF (scfh)	1,315	2,245	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/12/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/2/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S19 L03**

Consent Decree Tank System Number: **833**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S19 L03**

Consent Decree Tank System Number: **833**

**Audit Notes**

The field data sheets (PG 12 of FINAL PACKET pdf) verify the VOC line from tank to KO to be 2" while the stem design form (PG 8 of Final Packet pdf), signed eval, and stem engineering evaluation show that line to be 3". Nowhere in the work request does it state the line was to be changed from 2" to 3" nor does it state in the job sheets that work was completed on the VOC line from tank to ko to change from 2" to 3".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S30 L02**

Consent Decree Tank System Number: **132**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L02_FINAL PACKET	.pdf	1/4/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L02_STEM Engineering Evaluation_rev1	.xlsm	1/4/2018	STEM Engineering Evaluation Spreadsheet
SCHMIDT T4N-R65W-S30 L02_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L02_FINAL PACKET	.pdf	1/4/2018	Work Request
SCHMIDT T4N-R65W-S30 L02_FINAL PACKET	.pdf	1/4/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L02_WALKDOWN	.pdf	1/4/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L02_IR VERIFICATION	.pdf	1/4/2018	IR Verification Field Data Sheet
SCHMIDT T4N-R65W-S30 L02_1394_NORMAL	.mp4	1/3/2018	IR Camera Video Normal Operations
SCHMIDT T4N-R65W-S30 L02_1396_DUMP	.mp4	1/3/2018	IR Camera Video During Dump Event
SCHMIDT T4N-R65W-S30 L02_1397_POST	.mp4	1/3/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L02_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S30 L02**

Consent Decree Tank System Number: **132**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,331</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,111</b>	<b>21,111</b>	
Total VCS Capacity (scfh)	<b>23,442</b>	<b>26,944</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,934</b>	<b>22,435</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/12/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/12/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S30 L02**

Consent Decree Tank System Number: **132**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

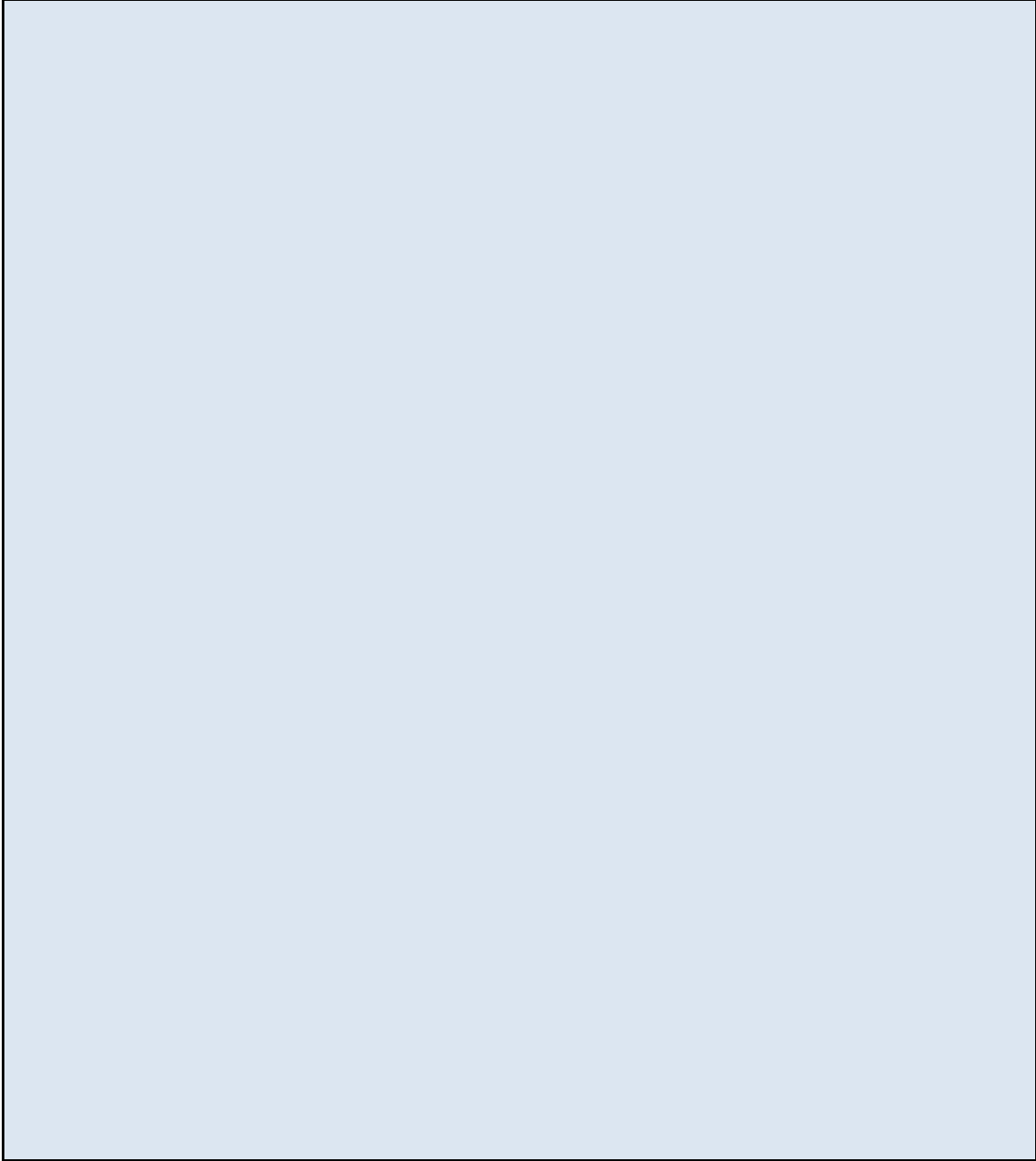
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S30 L02**

Consent Decree Tank System Number: **132**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S30 L03**

Consent Decree Tank System Number: **875**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L03_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L03_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SCHMIDT T4N-R65W-S30 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L03_FINAL PACKET	.pdf	7/11/2018	Work Request
SCHMIDT T4N-R65W-S30 L03_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L03_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L03_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SCHMIDT T4N-R65W-S30 L03_0029_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SCHMIDT T4N-R65W-S30 L03_0030_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SCHMIDT T4N-R65W-S30 L03_0031_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R65W-S30 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S30 L03**

Consent Decree Tank System Number: **875**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>370</b>	<b>370</b>	
Total VCS Capacity (scfh)	<b>4,590</b>	<b>4,970</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,146</b>	<b>1,525</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/13/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/24/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S30 L03**

Consent Decree Tank System Number: **875**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

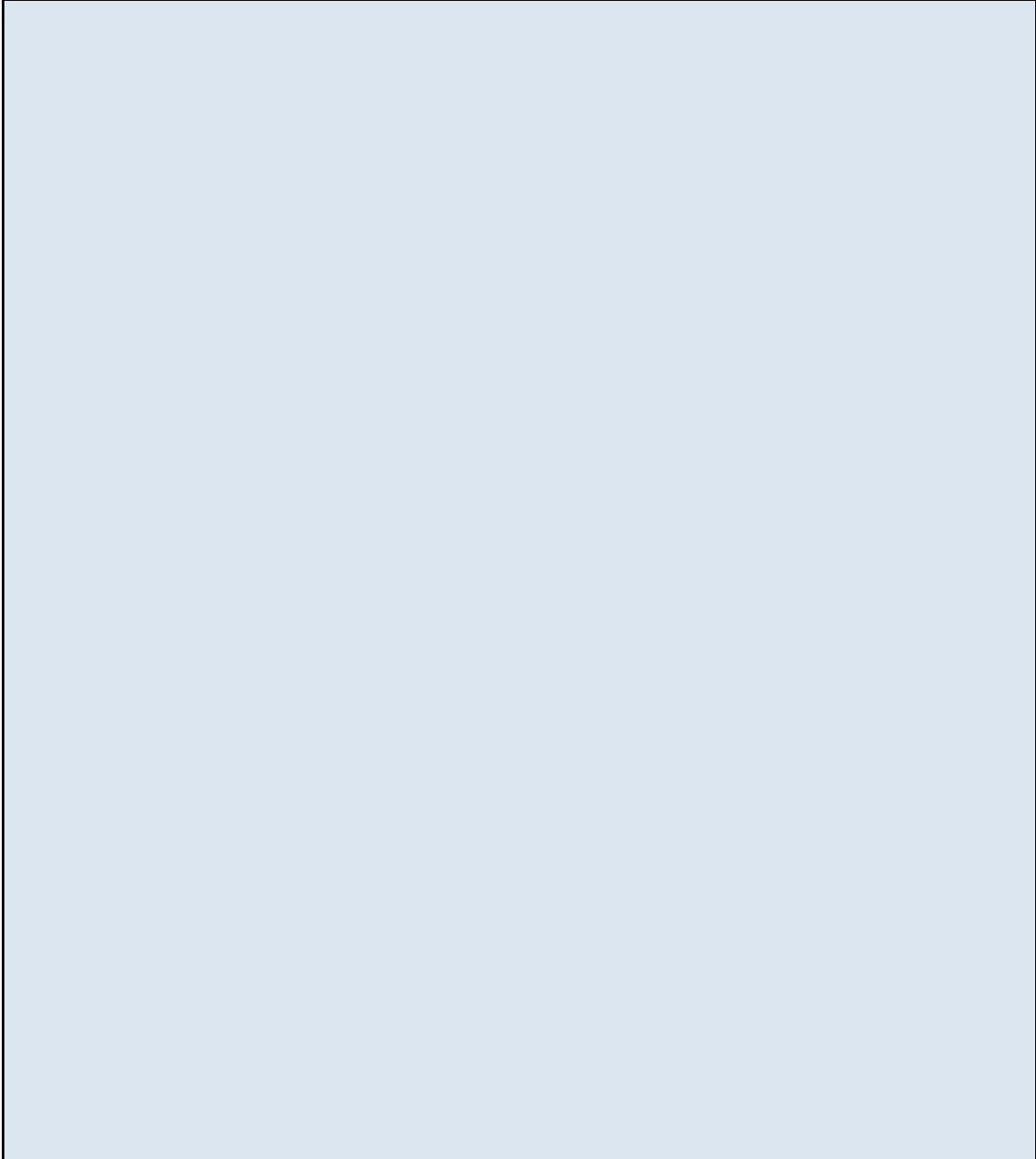
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R65W-S30 L03**

Consent Decree Tank System Number: **875**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L01\_SIGNED EVAL**

Consent Decree Tank System Number: **158**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L01_FINAL PACKET	.pdf	6/22/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	7/5/2016	STEM Engineering Evaluation Spreadsheet
SCHMIDT T4N-R66W-S25 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L01_FINAL PACKET	.pdf	6/22/2016	Work Request
SCHMIDT T4N-R66W-S25 L01_FINAL PACKET	.pdf	6/22/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L01_WALKDOWN	.pdf	6/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L01_IR VERIFICATION	.pdf	6/21/2016	IR Verification Field Data Sheet
SCHMIDT T4N-R66W-S25 L01_1150_NORMAL	.mp4	6/20/2016	IR Camera Video Normal Operations
SCHMIDT T4N-R66W-S25 L01_1151_DUMP	.mp4	6/20/2016	IR Camera Video During Dump Event
SCHMIDT T4N-R66W-S25 L01_1152_POST	.mp4	6/20/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L01\_SIGNED EVAL**

Consent Decree Tank System Number: **158**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>8,960</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>22,824</b>	<b>22,824</b>	
Total VCS Capacity (scfh)	<b>26,195</b>	<b>27,424</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,416</b>	<b>18,464</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 4/3/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/16/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L01\_SIGNED EVAL**

Consent Decree Tank System Number: **158**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,605	7,440
Oil Tank Working Rate	641	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	8,960	8,779

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L01\_SIGNED EVAL**

Consent Decree Tank System Number: **158**

**Audit Notes**

The walkdown checklist (SCHMIDT T4N-R66W-S25 L01\_WALKDOWN) was not marked as being complete. Completion was verified with other documentation in the final packet (SCHMIDT T4N-R66W-S25 L01\_FINAL PACKET).

As per the STEM work request form (SCHMIDT T4N-R66W-S25 L01\_FINAL PACKET, p 3) the existing 212 HLP LP oil dump valve was to be replaced with a 1" 1400 with 1/2" trim. The Job sheet does not confirm that the valve was replaced (SCHMIDT T4N-R66W-S25 L01\_FINAL PACKET, p 21). However, the walkdown checklist (SCHMIDT T4N-R66W-S25 L01\_WALKDOWN) A1 confirms that the trim size on the site matches what is in the signed eval (SCHMIDT T4N-R66W-S25 L01\_SIGNED EVAL). Therefore the trim was assumed to be correct and the valve was run as 2" to be conservative. It is unknown if the modeling guideline was strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SCHMIDT T4N-R66W-S25 L02

**Consent Decree Tank System Number:** 124

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L02_FINAL PACKET	.pdf	6/8/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L02_STEM Engineering Evaluation_rev1	.xlsm	8/11/2017	STEM Engineering Evaluation Spreadsheet
SCHMIDT T4N-R66W-S25 L02_SIGNED EVAL	.pdf	8/16/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L02_FINAL PACKET	.pdf	6/8/2018	Work Request
SCHMIDT T4N-R66W-S25 L02_FINAL PACKET	.pdf	6/8/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L02_WALKDOWN	.pdf	8/11/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L02_IR VERIFICATION UPDATED	.pdf	6/6/2018	IR Verification Field Data Sheet
SCHMIDT T4N-R66W-S25 L02_0017_NORMAL UPDATED	.mp4	6/5/2018	IR Camera Video Normal Operations
SCHMIDT T4N-R66W-S25 L02_0018_DUMP UPDATED	.mp4	6/5/2018	IR Camera Video During Dump Event
SCHMIDT T4N-R66W-S25 L02_0020_POST UPDATED	.mp4	6/5/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L02_SIGNED EVAL	.pdf	8/16/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L02**

Consent Decree Tank System Number: **124**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,244</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,339</b>	<b>2,339</b>	
Total VCS Capacity (scfh)	<b>6,520</b>	<b>6,939</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,438</b>	<b>2,695</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/26/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L02**

Consent Decree Tank System Number: **124**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,454</b>	<b>3,307</b>
Oil Tank Working Rate	<b>314</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,244</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L02**

Consent Decree Tank System Number: **124**

**Audit Notes**

The STEM Work Request indicated the 2" VOC line on the top of the oil storage tanks to the KO pot was to be replaced with a 3" line. There is no confirmation that the modification to the Tanks to KO VCS piping was modified to 3".

Noble provided information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 6/5/2017, field verification confirmed that the 3" VOC line from the tank to the KO was installed." The Engineering Design Standard was appropriately applied based on the provided field verification information.

There was no separator information provided in the Field Datasheets. The oil dump valve size (2" or 1") on the LP Separator could not be verified.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L03**

Consent Decree Tank System Number: **161**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L03_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L03_STEM Engineering Evaluation_rev1	.xls	7/11/2018	STEM Engineering Evaluation Spreadsheet
SCHMIDT T4N-R66W-S25 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L03_FINAL PACKET	.pdf	7/11/2018	Work Request
SCHMIDT T4N-R66W-S25 L03_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L03_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L03_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SCHMIDT T4N-R66W-S25 L03_2225_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SCHMIDT T4N-R66W-S25 L03_2226_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SCHMIDT T4N-R66W-S25 L03_2227_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHMIDT T4N-R66W-S25 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L03**

Consent Decree Tank System Number: **161**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>21,328</b>	<b>21,328</b>	
Total VCS Capacity (scfh)	<b>24,053</b>	<b>27,161</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,545</b>	<b>22,652</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L03**

Consent Decree Tank System Number: **161**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T4N-R66W-S25 L03**

Consent Decree Tank System Number: **161**

**Audit Notes**

The stem work request (PG 4 of Final Packet pdf) states to disconnect and bottom out 1 tank from fill header but leave connected to the VOC header to be used as a headspace tank however nowhere in the job sheets (PGs 23-27 of Final Packet pdf) does it state this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 11/17/2017, field verification confirmed that one tank was converted to a headspace tank."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T5N-R65W-S36 L01**

Consent Decree Tank System Number: **274**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SCHMIDT T5N-R65W-S36 L01_FINAL PACKET	.pdf	3/11/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T5N-R65W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SCHMIDT T5N-R65W-S36 L01_SIGNED EVAL	.pdf	2/1/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T5N-R65W-S36 L01_FINAL PACKET	.pdf	3/11/2016	Work Request
SCHMIDT T5N-R65W-S36 L01_FINAL PACKET	.pdf	3/11/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T5N-R65W-S36 L01_WALKDOWN	.pdf	3/7/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T5N-R65W-S36 L01_IR VERIFICATION	.pdf	3/9/2016	IR Verification Field Data Sheet
SCHMIDT T5N-R65W-S36 L01_0750_NORMAL	.mp4	3/9/2016	IR Camera Video Normal Operations
SCHMIDT T5N-R65W-S36 L01_0751_DUMP	.mp4	3/9/2016	IR Camera Video During Dump Event
SCHMIDT T5N-R65W-S36 L01_0752_POST	.mp4	3/9/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SCHMIDT T5N-R65W-S36 L01_SIGNED EVAL	.pdf	2/1/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T5N-R65W-S36 L01**

Consent Decree Tank System Number: **274**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>70</b>	<b>70</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>				

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>41,913</b>	<b>42,158</b>	<b>1%</b>
Calculated Burner Capacity (scfh)	<b>6,719</b>	<b>9,106</b>	
Headspace Surge Capacity (scfh)	<b>97,059</b>	<b>103,245</b>	
Total VCS Capacity (scfh)	<b>103,778</b>	<b>112,351</b>	
VCS Capacity minus PPIVF (scfh)	<b>61,865</b>	<b>70,193</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/25/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T5N-R65W-S36 L01**

Consent Decree Tank System Number: **274**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2409	2409						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7						
Working Flow (Mscfd) <sup>h,i</sup>	23	23						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77				
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25				
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200				
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bwpd) <sup>f,g</sup>	11381	11381	5068	5068				

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	46	46	20	20				
Working Flow (Mscfd) <sup>l</sup>	64	64	28	28				

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	34	11

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	22,641	22,641
Oil Tank Working Rate	1,909	1,904
Water Tank Flash Rate	5,483	5,482
Water Tank Working Rate	7,696	7,695
Tank Breathing Rate	1,902	1,664
Truck Loading Vapor	2,527	2,527
Total	42,158	41,913

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIDT T5N-R65W-S36 L01**

Consent Decree Tank System Number: **274**

**Audit Notes**

The Engineering Evaluation was completed with 5 - 300 bbl oil tanks and 2 - 300 bbl water tanks tied to the VCS, with one of the tanks utilized as a headspace only tank. The Field Data sheets indicate there are 6 - 300 bbl oil tanks and 2-300 bbl water tanks tied to the VCS. There is no Work Request to remove a tank from service, nor did the Job Sheet indicate a tank was removed from service. The Work Request and Job Sheets only indicate a tank was placed in headspace only service. The Modeling Guideline was not appropriately applied when evaluating with the incorrect number of tanks tied to the VCS.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER T4N-R65W-S19 L01**

Consent Decree Tank System Number: **831**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHMIER T4N-R65W-S19 L01_FINAL PACKET	.pdf	12/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER T4N-R65W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	12/16/2016	STEM Engineering Evaluation Spreadsheet
SCHMIER T4N-R65W-S19 L01_SIGNED EVAL	.pdf	12/16/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER T4N-R65W-S19 L01_FINAL PACKET	.pdf	12/16/2016	Work Request
SCHMIER T4N-R65W-S19 L01_FINAL PACKET	.pdf	12/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER T4N-R65W-S19 L01_WALKDOWN	.pdf	12/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER T4N-R65W-S19 L01_IR VERIFICATION	.pdf	12/15/2016	IR Verification Field Data Sheet
SCHMIER T4N-R65W-S19 L01_1713_NORMAL	.mp4	12/15/2016	IR Camera Video Normal Operations
SCHMIER T4N-R65W-S10 L01_1714_DUMP	.mp4	12/15/2016	IR Camera Video During Dump Event
SCHMIER T4N-R65W-S10 L01_1715_POST	.mp4	12/15/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER T4N-R65W-S19 L01_SIGNED EVAL	.pdf	12/16/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SCHMIER T4N-R65W-S19 L01

**Consent Decree Tank System Number:** 831

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	60							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,444	3,445	0%
Calculated Burner Capacity (scfh)	4,027	4,958	
Headspace Surge Capacity (scfh)	516	516	
Total VCS Capacity (scfh)	4,543	5,474	
VCS Capacity minus PPIVF (scfh)	1,099	2,030	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 11/16/2017  
 Audit Document Review Verified by: \_\_\_\_\_ Craig Bock  
 Audit Document Verification Date: \_\_\_\_\_ 12/21/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER T4N-R65W-S19 L01**

Consent Decree Tank System Number: **831**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	3,445	3,444
-------	-------	-------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER T4N-R65W-S19 L01**

Consent Decree Tank System Number: **831**

**Audit Notes**

Job Sheet, pg 19 of Final Packet, indicates a new tank was installed onsite. Provided documentation cannot be found indicating that a new tank was expected to be installed onsite. Pg 10 of the Final packet shows 1 Oil tank already existing onsite. Therefore It could be a possibility 2 Oil tanks are now onsite. IR videos only show 1 tank onsite. Therefore I believe 1 Oil tank onsite is accurate.

STEM work request form, Pg 4 of Final Packet, indicates the existing 2" VOC line from tank to KO is to be replaced with a 3" line. The signed eval also indicates a 3" Tank to KO line size. No documentation is provided showing that a 3" Tank to KO line was ever installed. Request data from Noble to prove 3" Tank to KO line was installed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER THOR T5N-R64W-S32 L01**

Consent Decree Tank System Number: **323**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
Schmier Thor T5N-R64W-S32 L01 FINAL PACKET	.pdf	2/10/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
Schmier Thor T5N-R64W-S32 L01_STEM Engineering Eval._rev1	.xlsm		STEM Engineering Evaluation Spreadsheet
Schmier Thor T5N-R64W-S32 L01_SIGNED EVAL	.pdf	8/24/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
N/A	.pdf	N/A	Work Request
Schmier Thor T5N-R64W-S32 L01 FINAL PACKET	.pdf	2/10/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
Schmier Thor T5N-R64W-S32 L01_Walkdown	.pdf	8/10/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
Schmier Thor T5N-R64W-S32 L01_IR Verification	.pdf	8/10/2016	IR Verification Field Data Sheet
Schmier Thor T5N-R64W-S32 L01_1383_Normal	.mp4	8/10/2016	IR Camera Video Normal Operations
Schmier Thor T5N-R64W-S32 L01_1384_Dump	.mp4	8/10/2016	IR Camera Video During Dump Event
Schmier Thor T5N-R64W-S32 L01_1385_Post	.mp4	8/10/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
Schmier Thor T5N-R64W-S32 L01_SIGNED EVAL	.pdf	8/24/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER THOR T5N-R64W-S32 L01**

Consent Decree Tank System Number: **323**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,017</b>	<b>2,221</b>	<b>-75%</b>
Calculated Burner Capacity (scfh)	<b>4,993</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>21,469</b>	<b>21,469</b>	
Total VCS Capacity (scfh)	<b>26,462</b>	<b>28,011</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,445</b>	<b>25,790</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien

Audit Document Review Date: 7/17/2018

Audit Document Review Verified by: James Van Horne

Audit Document Verification Date: 7/20/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER THOR T5N-R64W-S32 L01**

Consent Decree Tank System Number: **323**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>2.17</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>249</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>28.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>2</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,171</b>	<b>7,440</b>
Oil Tank Working Rate	<b>99</b>	<b>626</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,221</b>	<b>9,017</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER THOR T5N-R64W-S32 L01**

Consent Decree Tank System Number: **323**

**Audit Notes**

The Work Request indicated the oil dump valve on LP Separator was to be modified to 1/2 inch trim. Could not verify this work was completed from the documentation provided. The Modeling Guidance was still correctly applied because the existing trim (1/4") is conservative compared to the 1/2" requested trim.

Confirmed removal of 1 separator (#10445). Separator #10464 confirmed as repurposed to LP. This leaves #10455 and #14009 as being comingled. Based on the documentation provided, it can only be determined that one LP separator dumps to the tanks. The signed eval. model demonstrates 2 LP separators with simultaneous dumps which is conservative and is not a deviation from the modelling guide.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01

**Consent Decree Tank System Number:** 2237

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01_FINAL PACKET	.pdf	2/17/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	12/19/2016	STEM Engineering Evaluation Spreadsheet
SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01_FINAL PACKET	.pdf	2/17/2016	Work Request
SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01_FINAL PACKET	.pdf	2/17/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01_WALKDOWN	.pdf	2/17/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01_IR VERIFICATION	.pdf	2/12/2016	IR Verification Field Data Sheet
SCHIMIER TULLBERG JOSH URL T5N-R64W-S32 L01_0679_NORMAL	.mp4	2/11/2016	IR Camera Video Normal Operations
SCHIMIER TULLBERG JOSH URL T5N-R64W-S32 L01_0680_DUMP	.mp4	2/11/2016	IR Camera Video During Dump Event
SCHIMIER TULLBERG JOSH URL T5N-R64W-S32 L01_0682_POST	.mp4	2/11/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01**

Consent Decree Tank System Number: **2237**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,124</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>496</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,620</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>775</b>	<b>755</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 5/28/2108  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/7/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01**

Consent Decree Tank System Number: **2237**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,845</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHMIER TULLBERG JOSH URL T5N-R64W-S32 L01**

Consent Decree Tank System Number: **2237**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SCHOLFIELD ST T6N-R64W-S36 L01

**Consent Decree Tank System Number:** 284

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCHOLFIELD ST T6N-R64W-S36 L01_FINAL PACKET	.pdf	8/28/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCHOLFIELD ST T6N-R64W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	6/27/2017	STEM Engineering Evaluation Spreadsheet
SCHOLFIELD ST T6N-R64W-S36 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCHOLFIELD ST T6N-R64W-S36 L01_FINAL PACKET // SCHOLFIELD ST T6N-R64W-S36 L01_COMPLETED TLO	.pdf	8/28/2015 // 5/21/2018	Work Request
SCHOLFIELD ST T6N-R64W-S36 L01_FINAL PACKET // SCHOLFIELD ST T6N-R64W-S36 L01_COMPLETED TLO	.pdf	8/28/2015 // 5/21/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCHOLFIELD ST T6N-R64W-S36 L01_WALKDOWN	.pdf	8/28/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCHOLFIELD ST T6N-R64W-S36 L01_IR VERIFICATION	.pdf	8/27/2015	IR Verification Field Data Sheet
SCHOLFIELD ST T6N-R64W-S36 L01_0007_NORMAL	.mp4	8/26/2015	IR Camera Video Normal Operations
SCHOLFIELD ST T6N-R64W-S36 L01_0008_DUMP	.mp4	8/26/2015	IR Camera Video During Dump Event
SCHOLFIELD ST T6N-R64W-S36 L01_0009_POST	.mp4	8/26/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCHOLFIELD ST T6N-R64W-S36 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SCHOLFIELD ST T6N-R64W-S36 L01

**Consent Decree Tank System Number:** 284

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,236</b>	<b>13,237</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,904</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>72,332</b>	<b>72,332</b>	
Total VCS Capacity (scfh)	<b>75,236</b>	<b>78,165</b>	
VCS Capacity minus PPIVF (scfh)	<b>62,000</b>	<b>64,928</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/11/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/28/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHOLFIELD ST T6N-R64W-S36 L01**

Consent Decree Tank System Number: **284**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2213</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>213.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>21</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

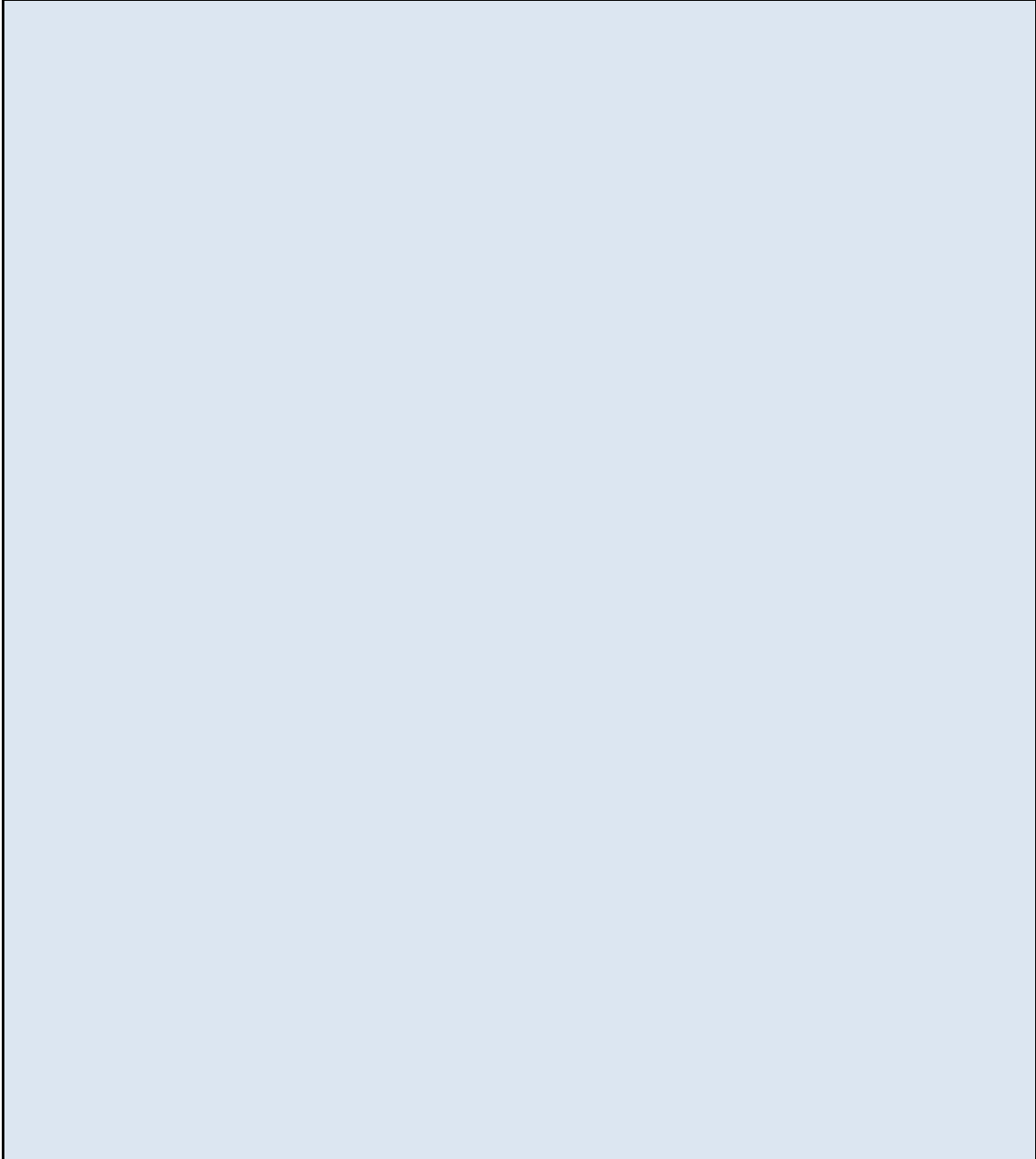
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>8,883</b>	<b>8,883</b>
Oil Tank Working Rate	<b>877</b>	<b>875</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>13,237</b>	<b>13,236</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCHOLFIELD ST T6N-R64W-S36 L01**

Consent Decree Tank System Number: **284**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOOTER HORNTON T3N-R64W-S18 L01**

Consent Decree Tank System Number: **379**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCOOTER HORNTON T3N-R64W-S18 L01_FINAL PACKET	.pdf	10/2/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER HORNTON T3N-R64W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	9/20/2016	STEM Engineering Evaluation Spreadsheet
SCOOTER HORNTON T3N-R64W-S18 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER HORNTON T3N-R64W-S18 L01_FINAL PACKET	.pdf	10/2/2017	Work Request
SCOOTER HORNTON T3N-R64W-S18 L01_FINAL PACKET	.pdf	10/2/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER HORNTON T3N-R64W-S18 L01_WALKDOWN	.pdf	9/21/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER HORNTON T3N-R64W-S18 L01_IR VERIFICATION	.pdf	9/20/2016	IR Verification Field Data Sheet
SCOOTER HORNTON T3N-R64W-S18 L01_1516_NORMAL	.mp4	9/19/2016	IR Camera Video Normal Operations
SCOOTER HORNTON T3N-R64W-S18 L01_1517_DUMP	.mp4	9/19/2016	IR Camera Video During Dump Event
SCOOTER HORNTON T3N-R64W-S18 L01_1518_POST	.mp4	9/19/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER HORNTON T3N-R64W-S18 L01_SIGNED EVAL	.pdf	9/21/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SCOOTER HORNTON T3N-R64W-S18 L01**

**Consent Decree Tank System Number:** **379**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,320</b>	<b>4,481</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,055</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>3,313</b>	<b>3,313</b>	
Total VCS Capacity (scfh)	<b>7,368</b>	<b>7,913</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,048</b>	<b>3,432</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 3/19/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/2/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOOTER HORNTON T3N-R64W-S18 L01**

Consent Decree Tank System Number: **379**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,454</b>	<b>3,307</b>
Oil Tank Working Rate	<b>314</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,481</b>	<b>4,320</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SCOOTER HORNTON T3N-R64W-S18 L01**

**Consent Decree Tank System Number:** **379**

**Audit Notes**

The Walkdown Checklist (SCOOTER HORNTON T3N-R64W-S18 L01\_WALKDOWN.pdf, pg. 4) did not indicate if all items on the Work Request form had been completed. Completion of the Work Request was verified through other documentation in the Final Packet.

Per the Work Request (SCOOTER HORNTON T3N-R64W-S18 L01\_FINAL PACKET.pdf, pg. 3) the dump valves on the LP separator were to be replaced with a 1" valve with 1/2" trim. The Job Sheet SCOOTER HORNTON T3N-R64W-S18 L01.pdf, pg 41) does not reference replacement of dump valve or trim. A1 of the walkdown checklist (SCOOTER HORNTON T3N-R64W-S18 L01\_WALKDOWN) confirms the trim was changed to 1/2". A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

This site was selected for an additional IR Camera inspection because the original footage did not show the tops of the PRVs above the tanks

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOOTER T3N-R64W-S18 L02**

Consent Decree Tank System Number: **1202**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCOOTER T3N-R64W-S18 L02_FINAL PACKET	.pdf	2/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER T3N-R64W-S18 L02_STEM Engineering Evaluation_rev1	.xlsm	12/16/2016	STEM Engineering Evaluation Spreadsheet
SCOOTER T3N-R64W-S18 L02_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER T3N-R64W-S18 L02_FINAL PACKET	.pdf	2/24/2016	Work Request
SCOOTER T3N-R64W-S18 L02_FINAL PACKET	.pdf	2/24/2016	Construction Jobsheets
2018 Draft Attachments to Comment Letter	.pdf	3/27/2020	Supplemental Competition Documentation

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER T3N-R64W-S18 L02_WALKDOWN	.pdf	2/24/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER T3N-R64W-S18 L02_IR VERIFICATION	.pdf	2/22/2016	IR Verification Field Data Sheet
SCOOTER T3N-R64W-S18 L02_0706_NORMAL	.mp4	2/17/2016	IR Camera Video Normal Operations
SCOOTER T3N-R64W-S18 L02_0707_DUMP	.mp4	2/17/2016	IR Camera Video During Dump Event
SCOOTER T3N-R64W-S18 L02_0708_POST	.mp4	2/17/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCOOTER T3N-R64W-S18 L02_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SCOOTER T3N-R64W-S18 L02**

**Consent Decree Tank System Number:** **1202**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,924</b>	<b>3,925</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,219</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>775</b>	<b>775</b>	
Total VCS Capacity (scfh)	<b>4,994</b>	<b>5,375</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,070</b>	<b>1,450</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/10/2018  
 Audit Document Review Verified by: Chris Boggess and James Van Horne  
 Audit Document Verification Date: 11/13/2018 and 8/25/2020



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOOTER T3N-R64W-S18 L02**

Consent Decree Tank System Number: **1202**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	
scfh vapor/tank <sup>i</sup>	<b>317</b>	
Mscfd	<b>8</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>317</b>	<b>317</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>3,925</b>	<b>3,924</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOOTER T3N-R64W-S18 L02**

Consent Decree Tank System Number: **1202**

**Audit Notes**

The walkdown checklist (SCOOTER T3N-R64W-S18 L02\_WALKDOWN) was not marked as being complete. Completion was verified through other supplied documentation in the final packet (SCOOTER T3N-R64W-S18 L02\_FINAL PACKET).

The STEM work request document (SCOOTER T3N-R64W-S18 L02\_FINAL PACKET, p 3) requests that the 2" VOC line from the tanks to the KO be replaced with 3" lines. There is no documentation to confirm this change was made to the site. The signed evaluation (SCOOTER T3N-R64W-S18 L02\_SIGNED EVAL) uses 3" lines. The model (SCOOTER T3N-R64W-S18 L02\_STEM Engineering Evaluation\_rev1) was run using 3" pipe. The audit used a 2" line to be conservative. Noble provided confirmation in writing on 8/25/2020 that the line was replaced with 3" diameter pipe

The STEM work request document (SCOOTER T3N-R64W-S18 L02\_FINAL PACKET, p 3) requests that the PSHH be set to 65 psig. However, an email from 1/15/2016 (SCOOTER T3N-R64W-S18 L02\_FINAL PACKET, p 24) states the pressure switch was set to 70 psi. The signed evaluation was completed at 65 psig. Noble provided additional information on 3/27/2020 in response to the draft audit report confirming the PSHH was set to 65 psig.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOTT WESTERMAN T7N-R64W-S32 L01**

Consent Decree Tank System Number: **1787**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SCOTT WESTERMAN T7N-R64W-S32 L01_FINAL PACKET, pg 10 - 19	.pdf	9/22/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SCOTT WESTERMAN T7N-R64W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	6/13/2017	STEM Engineering Evaluation Spreadsheet
SCOTT WESTERMAN T7N-R64W-S32 L01_SIGNED EVAL	.pdf	6/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SCOTT WESTERMAN T7N-R64W-S32 L01_FINAL PACKET, pg 3	.pdf	9/22/2017	Work Request
SCOTT WESTERMAN T7N-R64W-S32 L01_FINAL PACKET, pg 20	.pdf	9/22/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SCOTT WESTERMAN T7N-R64W-S32 L01_WALKDOWN	.pdf	5/19/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SCOTT WESTERMAN T7N-R64W-S32 L01_IR VERIFICATION	.pdf	5/18/2017	IR Verification Field Data Sheet
SCOTT WESTERMAN T7N-R64W-S32 L01_2062_NORMAL	.mp4	5/15/2017	IR Camera Video Normal Operations
SCOTT WESTERMAN T7N-R65W-S32 L01_2063_DUMP	.mp4	5/15/2017	IR Camera Video During Dump Event
SCOTT WESTERMAN T7N-R65W-S32 L01_2064_POST	.mp4	5/15/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SCOTT WESTERMAN T7N-R64W-S32 L01_SIGNED EVAL	.pdf	6/15/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOTT WESTERMAN T7N-R64W-S32 L01**

Consent Decree Tank System Number: **1787**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>14,162</b>	<b>14,162</b>	
Total VCS Capacity (scfh)	<b>18,189</b>	<b>19,120</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,884</b>	<b>15,814</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Craig Bock  
 Audit Document Review Date: 11/17/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 11/19/2017



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOTT WESTERMAN T7N-R64W-S32 L01**

Consent Decree Tank System Number: **1787**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SCOTT WESTERMAN T7N-R64W-S32 L01**

Consent Decree Tank System Number: **1787**

**Audit Notes**

All work request items were addressed in the job sheet.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01

**Consent Decree Tank System Number:** 564

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_FINAL PACKET	.pdf	9/1/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_STEM Engineer Eval_rev1	.xlsm	6/2/2017	STEM Engineering Evaluation Spreadsheet
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_SIGNED EVAL	.pdf	6/9/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_FINAL PACKET	.pdf	9/14/2016	Work Request
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_FINAL PACKET	.pdf	3/24/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_WALKDOWN	.pdf	5/19/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_IR VERIFICATION_UPDATE	.pdf	11/17/2017	IR Verification Field Data Sheet Updated
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_0026_NORMAL_UPDATE	.mp4	11/7/2017	IR Camera Video Normal Operations Updated
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_0027_DUMP_UPDATE	.mp4	11/7/2017	IR Camera Video During Dump Event Updated
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_0028_POST_UPDATE	.mp4	11/7/2017	IR Camera Video Post Dump Event Updated
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_IR VERIFICATION	.pdf	5/18/2017	IR Verification Field Data Sheet
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_2052_NORMAL	.mp4	5/12/2017	IR Camera Video Normal Operations
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_2053_DUMP	.mp4	5/12/2017	IR Camera Video During Dump Event
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_2054_POST	.mp4	5/12/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01_SIGNED EVAL	.pdf	6/9/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01

**Consent Decree Tank System Number:** 564

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 3/8"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	TEC 4-CS (48" Tornado)			
Number of Units	1			
Man. Capacity (MSCFD)	110.4			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	2,673	2,674	0%
Calculated Burner Capacity (scfh)	4,089	4,600	
Headspace Surge Capacity (scfh)	346	346	
Total VCS Capacity (scfh)	4,435	4,946	
VCS Capacity minus PPIVF (scfh)	1,762	2,272	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/23/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01**

Consent Decree Tank System Number: **564**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>431</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>48.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,027</b>	<b>2,027</b>
Oil Tank Working Rate	<b>171</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,674</b>	<b>2,673</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SEMMEN USX UPRR SLOAN T2N-R64W-S17 L01**

Consent Decree Tank System Number: **564**

**Audit Notes**

Trim size is confirmed to have been changed from item A1 on the Walkdown Checklist.

Emissions visible at 2:33 mark of "Post Update" IR video.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SEYLER T5N-R64W-S14 L02**

Consent Decree Tank System Number: **2141**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SEYLER T5N-R64W-S14 L02_FINAL PACKET	.pdf	10/19/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SEYLER T5N-R64W-S14 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SEYLER T5N-R64W-S14 L02_SIGNED EVAL	.pdf	1/17/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SEYLER T5N-R64W-S14 L02_FINAL PACKET	.pdf	10/19/2015	Work Request
SEYLER T5N-R64W-S14 L02_FINAL PACKET	.pdf	10/19/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SEYLER T5N-R64W-S14 L02_WALKDOWN	.pdf	9/29/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SEYLER T5N-R64W-S14 L02_IR VERIFICATION	.pdf	10/13/2015	IR Verification Field Data Sheet
SEYLER T5N-R64W-S14 L02_0345_NORMAL	.mp4	10/13/2015	IR Camera Video Normal Operations
SEYLER T5N-R64W-S14 L02_0346_DUMP	.mp4	10/13/2015	IR Camera Video During Dump Event
SEYLER T5N-R64W-S14 L02_0347_POST	.mp4	10/13/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SEYLER T5N-R64W-S14 L02_SIGNED EVAL	.pdf	1/17/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SEYLER T5N-R64W-S14 L02

**Consent Decree Tank System Number:** 2141

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	2" & 1"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	COMM 200 48"			
Number of Units	1			
Man. Capacity (MSCFD)	157			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	12,748	12,751	0%
Calculated Burner Capacity (scfh)	4,961	6,542	
Headspace Surge Capacity (scfh)	12,524	12,524	
Total VCS Capacity (scfh)	17,485	19,066	
VCS Capacity minus PPIVF (scfh)	4,737	6,315	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/25/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SEYLER T5N-R64W-S14 L02**

Consent Decree Tank System Number: **2141**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

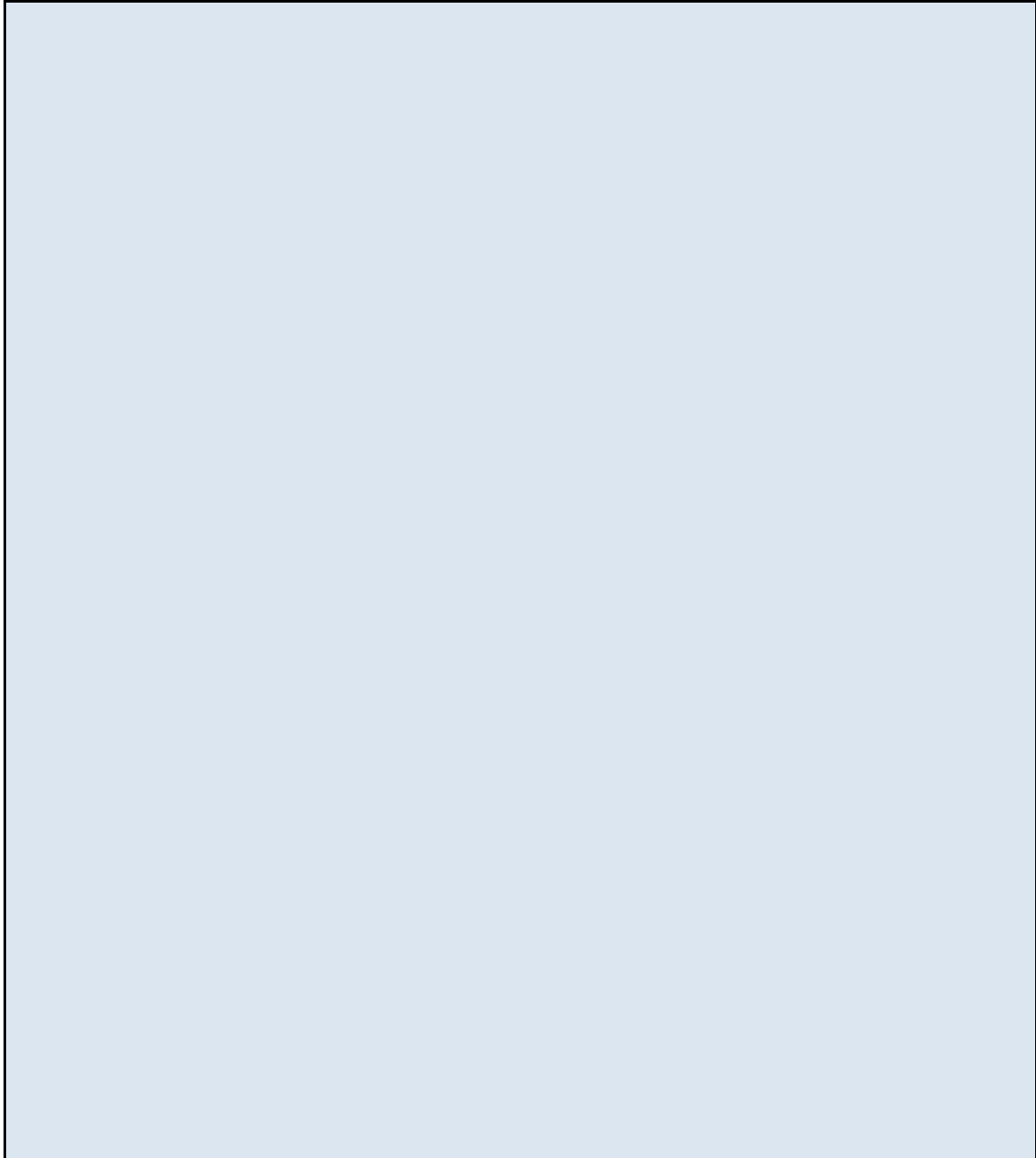
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	12,751	12,748

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SEYLER T5N-R64W-S14 L02**

Consent Decree Tank System Number: **2141**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01**

Consent Decree Tank System Number: **629**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_FINAL PACKET	.pdf	4/27/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_SIGNED EVAL	.pdf	6/29/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_FINAL PACKET	.pdf	4/27/2016	Work Request
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_FINAL PACKET	.pdf	4/27/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_WALKDOWN	.pdf	4/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_IR VERIFICATION	.pdf	4/26/2016	IR Verification Field Data Sheet
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_0912_NORMAL	.mp4	4/26/2016	IR Camera Video Normal Operations
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_0913_DUMP	.mp4	4/26/2016	IR Camera Video During Dump Event
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_0914_POST	.mp4	4/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01_SIGNED EVAL	.pdf	6/29/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01**

Consent Decree Tank System Number: **629**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>11,782</b>	<b>11,904</b>	<b>1%</b>
Calculated Burner Capacity (scfh)	<b>5,422</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>24,688</b>	<b>3,868</b>	
Total VCS Capacity (scfh)	<b>30,110</b>	<b>15,535</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,328</b>	<b>3,631</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/25/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/20/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SH FARMS SANDY HILLS PLUS T4N-R64W-S17 L01**

Consent Decree Tank System Number: **629**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	23	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,440
Oil Tank Working Rate	655	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	1,189
Truck Loading Vapor	2,527	2,527
<b>Total</b>	<b>11,904</b>	<b>11,782</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SH FARMS SANDY HILLS PLUSS T4N-R64W-S17 L01**

Consent Decree Tank System Number: **629**

**Audit Notes**

The Work Request indicated the oil dump valves on HLP Separators 2 & 3 were to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on either separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "N/A" making it unclear as to whether all tank fill lines are configured to enable LP separators to produce into all tanks.

Noble provided information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 3/30/2016, field verification confirmed that one tank was converted to a headspace tank." The Engineering Design Standard has been appropriately applied based on the provided field verification information.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01

**Consent Decree Tank System Number:** 2329

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_1294_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_1295_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_1296_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01**

**Consent Decree Tank System Number:** **2329**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>8,781</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>23,111</b>	<b>23,111</b>	
Total VCS Capacity (scfh)	<b>26,027</b>	<b>28,944</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,248</b>	<b>20,164</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/25/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/28/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01**

Consent Decree Tank System Number: **2329**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

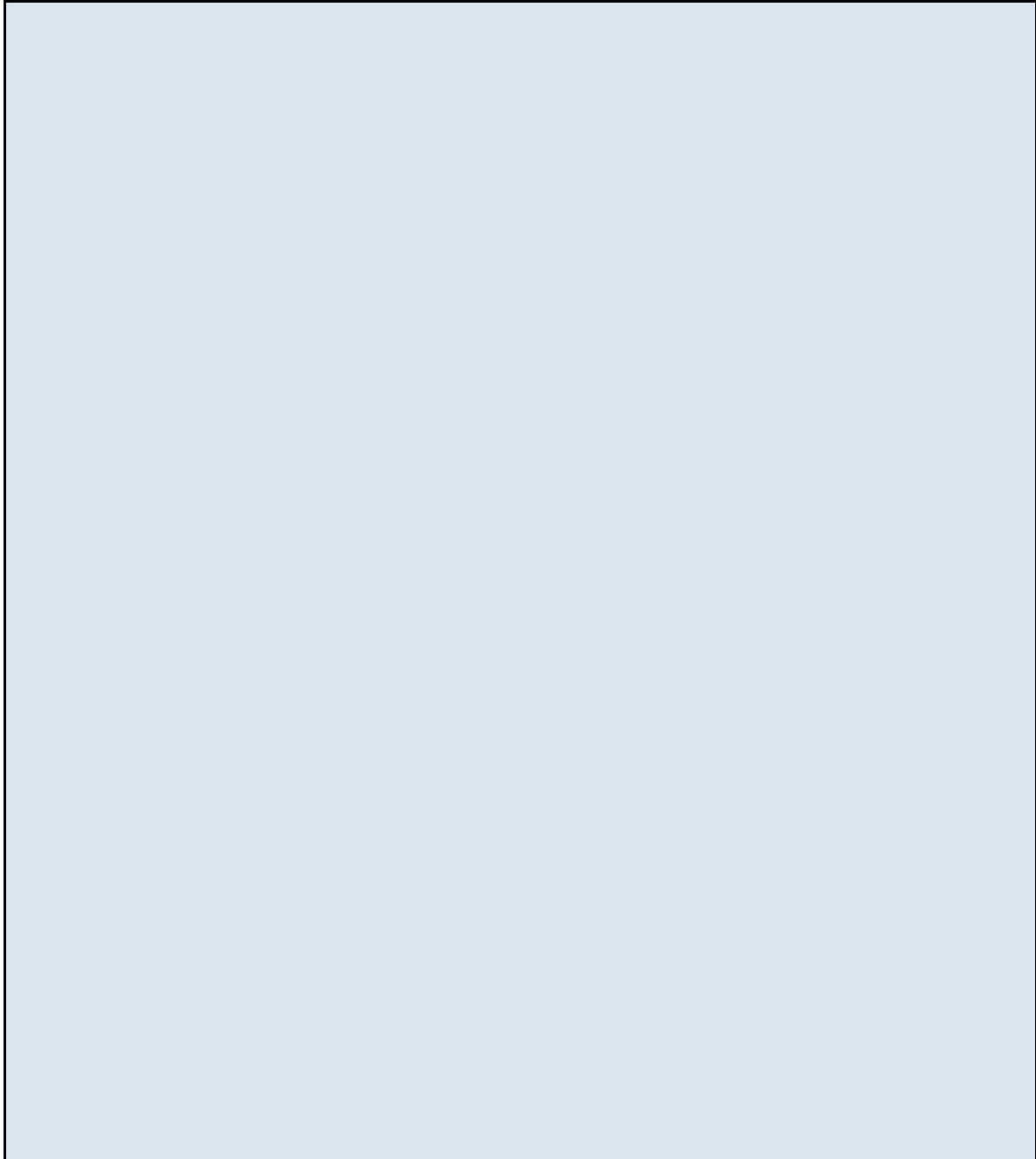
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	8,781	8,779

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE DOUGHERY CHARLTON T4N-R65W-S20 L01**

Consent Decree Tank System Number: **2329**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SHABLE FED T9N-R60W-S33 L01

**Consent Decree Tank System Number:** 570

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_FINAL PACKET	.pdf	4/15/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	7/13/2017	STEM Engineering Evaluation Spreadsheet
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_FINAL PACKET			
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_Rework	.pdf	4/15/2016 9/6/2017	Work Request
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_FINAL PACKET	.pdf	4/15/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_0342_NORMAL	.mp4	4/13/2016	IR Camera Video Normal Operations
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_0343_DUMP	.mp4	4/13/2016	IR Camera Video During Dump Event
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_0344_POST	.mp4	4/13/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE FED T9N-R60W-S33 L01**

Consent Decree Tank System Number: **570**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>10</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>	<b>140</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>	<b>140</b>	<b>140</b>	<b>140</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>				

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>3</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>94,795</b>	<b>96,231</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>8,459</b>	<b>17,500</b>	
Headspace Surge Capacity (scfh)	<b>114,479</b>	<b>114,479</b>	
Total VCS Capacity (scfh)	<b>122,938</b>	<b>131,979</b>	
VCS Capacity minus PPIVF (scfh)	<b>28,143</b>	<b>35,748</b>	

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 1/10/2018  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/14/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE FED T9N-R60W-S33 L01**

Consent Decree Tank System Number: **570**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50	1.50						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	1.61	1.61						
Gas/Oil Ratio (scf/bbl)	256.2	256.2						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77	0.77						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	601	601						
Vapor Pressure (psia) <sup>c</sup>	153	153						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.82	0.82						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	3603	3603						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	923.1	923.1						
Working Flow (Mscfd) <sup>h,i</sup>	34	34						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.77	0.77	0.77	0.77				
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	21.25	21.25	21.25	21.25				
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200				
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1				
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.96	0.96	0.96	0.96				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bwpd) <sup>f,g</sup>	6907	6907	6907	6907				

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	28	28	28	28				
Working Flow (Mscfd) <sup>l</sup>	39	39	39	39				

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	57	11

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	76,927	76,927
Oil Tank Working Rate	2,856	2,848
Water Tank Flash Rate	4,605	4,604
Water Tank Working Rate	6,464	6,463
Tank Breathing Rate	2,853	1,426
Truck Loading Vapor	2,527	2,527
Total	96,231	94,795

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE FED T9N-R60W-S33 L01**

Consent Decree Tank System Number: **570**

**Audit Notes**

The walkdown checklist (SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (SHABLE T9N-R60W-S33 L01 & SHABLE FED T9N-R60W-S33 L01\_FINAL PACKET).

Tank System consists of two banks of 4 oil, 1 headspace, and 1 water tank each. The signed evaluation did include breathing losses from the non producing bank. The modeling guideline has not be strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE T4N-R66W-S17 L01**

Consent Decree Tank System Number: **130**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHABLE T4N-R66W-S17 L01_FINAL PACKET	.pdf	5/18/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T4N-R66W-S17 L01_STEM Engineering Evaluation_rev1	.xlsm	5/20/2016	STEM Engineering Evaluation Spreadsheet
SHABLE T4N-R66W-S17 L01_SIGNED EVAL	.pdf	5/24/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T4N-R66W-S17 L01_FINAL PACKET	.pdf	5/18/2016	Work Request
SHABLE T4N-R66W-S17 L01_FINAL PACKET	.pdf	5/18/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T4N-R66W-S17 L01_WALKDOWN	.pdf	5/18/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T4N-R66W-S17 L01_IR VERIFICATION	.pdf	5/16/2016	IR Verification Field Data Sheet
SHABLE T4N-R66W-S17 L01_0977_NORMAL	.mp4	5/12/2016	IR Camera Video Normal Operations
SHABLE T4N-R66W-S17 L01_0978_DUMP	.mp4	5/12/2016	IR Camera Video During Dump Event
SHABLE T4N-R66W-S17 L01_0979_POST	.mp4	5/12/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T4N-R66W-S17 L01_SIGNED EVAL	.pdf	5/24/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHABLE T4N-R66W-S17 L01**

**Consent Decree Tank System Number:** **130**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,870</b>	<b>2,870</b>	
Total VCS Capacity (scfh)	<b>5,797</b>	<b>8,703</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,715</b>	<b>4,620</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 5/28/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/8/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE T4N-R66W-S17 L01**

Consent Decree Tank System Number: **130**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

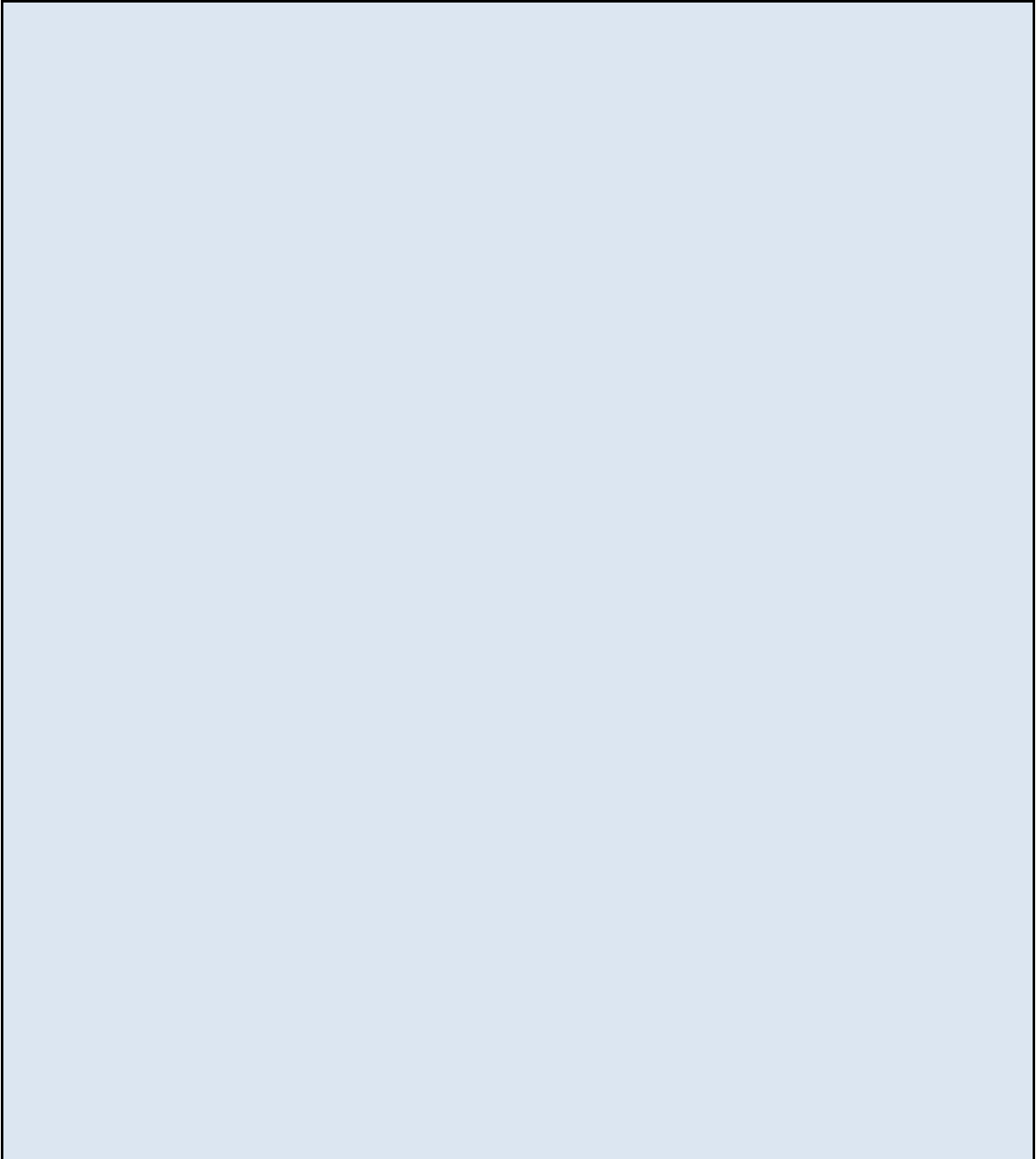
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE T4N-R66W-S17 L01**

Consent Decree Tank System Number: **130**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE T8N-R60W-S5 L01**

Consent Decree Tank System Number: **2040**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHABLE T8N-R60W-S5 L01_FINAL PACKET	.pdf	4/29/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T8N-R60W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SHABLE T8N-R60W-S5 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T8N-R60W-S5 L01_FINAL PACKET	.pdf	4/29/2016	Work Request
SHABLE T8N-R60W-S5 L01_FINAL PACKET	.pdf	4/29/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T8N-R60W-S5 L01_WALKDOWN	.pdf	4/28/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T8N-R60W-S5 L01_IR VERIFICATION	.pdf	4/28/2016	IR Verification Field Data Sheet
SHABLE T8N-R60W-S5 L01_0006_NORMAL	.mp4	4/28/2016	IR Camera Video Normal Operations
SHABLE T8N-R60W-S5 L01_0007_DUMP	.mp4	4/28/2016	IR Camera Video During Dump Event
SHABLE T8N-R60W-S5 L01_0008_POST	.mp4	4/28/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHABLE T8N-R60W-S5 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHABLE T8N-R60W-S5 L01**  
**Consent Decree Tank System Number:** **2040**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>	<b>500</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109,272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>71,223</b>	<b>73,241</b>	<b>3%</b>
Calculated Burner Capacity (scfh)	<b>5,949</b>	<b>10,386</b>	
Headspace Surge Capacity (scfh)	<b>127,327</b>	<b>127,327</b>	
Total VCS Capacity (scfh)	<b>133,276</b>	<b>137,713</b>	
VCS Capacity minus PPIVF (scfh)	<b>62,053</b>	<b>64,472</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/25/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE T8N-R60W-S5 L01**

Consent Decree Tank System Number: **2040**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.72</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.83</b>							
Gas/Oil Ratio (scf/bbl)	<b>348.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>633</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>188</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4120</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1433.8</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>39</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>7663</b>	<b>12689</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>31</b>	<b>51</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>43</b>	<b>71</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>23</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>59,740</b>	<b>59,740</b>
Oil Tank Working Rate	<b>1,632</b>	<b>1,628</b>
Water Tank Flash Rate	<b>3,392</b>	<b>2,554</b>
Water Tank Working Rate	<b>4,761</b>	<b>3,585</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>73,241</b>	<b>71,223</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHABLE T8N-R60W-S5 L01**

Consent Decree Tank System Number: **2040**

**Audit Notes**

The separators on location have pressure controlled by pneumatic controllers. The initial provided documentation did not confirm the controller shut-in pressure for the HP Separator was set to 175 psig as requested in the STEM Work Request dated 1/29/2016.

The separator pneumatic PSHH is set by the operator, not automation personnel, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states the separator cannot operate above 175 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation. It was determined the Modeling Guidelines were appropriately applied based on the administrative use of the One-Pager.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON ALLISON T4N-R65W-S24 L01**

Consent Decree Tank System Number: **662**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHELTON ALLISON T4N-R65W-S24 L01_FINAL PACKET	.pdf	6/15/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ALLISON T4N-R65W-S24 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SHELTON ALLISON T4N-R65W-S24 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ALLISON T4N-R65W-S24 L01_FINAL PACKET	.pdf	6/15/2016	Work Request
SHELTON ALLISON T4N-R65W-S24 L01_FINAL PACKET	.pdf	6/15/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ALLISON T4N-R65W-S24 L01_WALKDOWN	.pdf	6/9/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ALLISON T4N-R65W-S24 L01_IR VERIFICATION	.pdf	6/13/2016	IR Verification Field Data Sheet
SHELTON ALLISON T4N-R65W-S24 L01_1132_NORMAL	.mp4	6/13/2016	IR Camera Video Normal Operations
SHELTON ALLISON T4N-R65W-S24 L01_1133_DUMP	.mp4	6/13/2016	IR Camera Video During Dump Event
SHELTON ALLISON T4N-R65W-S24 L01_1134_POST	.mp4	6/13/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ALLISON T4N-R65W-S24 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SHELTON ALLISON T4N-R65W-S24 L01

**Consent Decree Tank System Number:** 662

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,788</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>2,555</b>	<b>2,555</b>	
Total VCS Capacity (scfh)	<b>6,343</b>	<b>7,108</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,261</b>	<b>3,025</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:  
 Audit Document Review Date:  
 Audit Document Review Verified by:  
 Audit Document Verification Date:

Brian Cherwien  
 \_\_\_\_\_  
 7/25/2018  
 \_\_\_\_\_  
 Angela M. Oberlander  
 \_\_\_\_\_  
 9/7/2018  
 \_\_\_\_\_



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON ALLISON T4N-R65W-S24 L01**

Consent Decree Tank System Number: **662**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON ALLISON T4N-R65W-S24 L01**

Consent Decree Tank System Number: **662**

**Audit Notes**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON ARENS T4N-R65W-S23 L01**

Consent Decree Tank System Number: **152**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHELTON ARENS T4N-R65W-S23 L01_FINAL PACKET	.pdf	7/7/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ARENS T4N-R65W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SHELTON ARENS T4N-R65W-S23 L01_SIGNED EVAL	.pdf	8/1/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ARENS T4N-R65W-S23 L01_FINAL PACKET	.pdf	7/7/2016	Work Request
SHELTON ARENS T4N-R65W-S23 L01_FINAL PACKET	.pdf	7/7/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ARENS T4N-R65W-S23 L01_WALKDOWN	.pdf	7/6/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ARENS T4N-R65W-S23 L01_IR VERIFICATION	.pdf	7/6/2016	IR Verification Field Data Sheet
SHELTON ARENS T4N-R65W-S23 L01_1247_NORMAL	.mp4	7/6/2016	IR Camera Video Normal Operations
SHELTON ARENS T4N-R65W-S23 L01_1248_DUMP	.mp4	7/6/2016	IR Camera Video During Dump Event
SHELTON ARENS T4N-R65W-S23 L01_1249_POST	.mp4	7/6/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHELTON ARENS T4N-R65W-S23 L01_SIGNED EVAL	.pdf	8/1/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHELTON ARENS T4N-R65W-S23 L01**  
**Consent Decree Tank System Number:** **152**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,088</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,394</b>	<b>2,394</b>	
Total VCS Capacity (scfh)	<b>6,482</b>	<b>6,994</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,974</b>	<b>2,485</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/7/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON ARENS T4N-R65W-S23 L01**

Consent Decree Tank System Number: **152**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>l</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

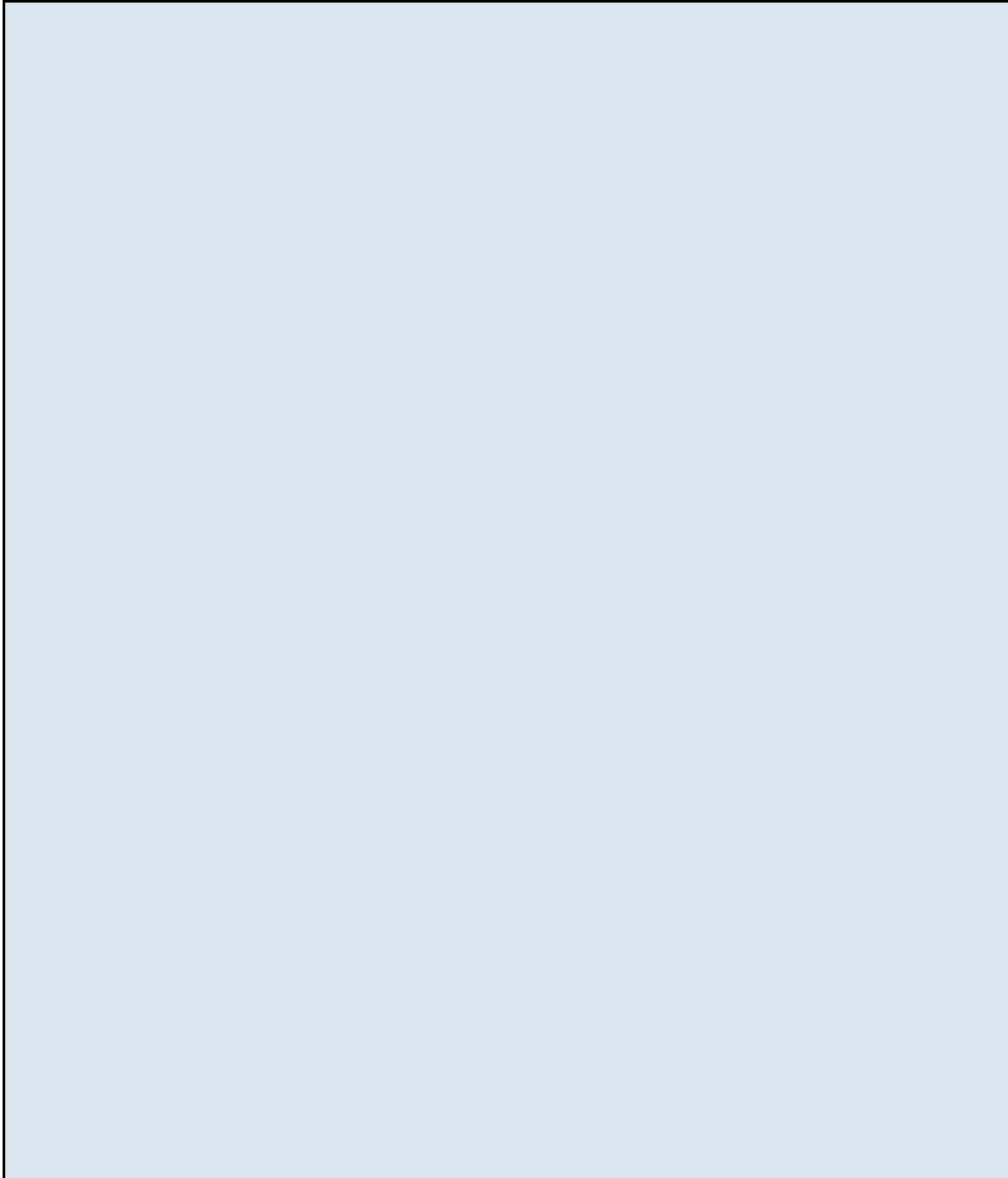
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: SHELTON ARENS T4N-R65W-S23 L01

Consent Decree Tank System Number: 152

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON STROH T3N-R65W-S1 L01**

Consent Decree Tank System Number: **692**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHELTON STROH T3N-R65W-S1 L01_FINAL PACKET	.pdf	6/1/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHELTON STROH T3N-R65W-S1 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/23/2017	STEM Engineering Evaluation Spreadsheet
SHELTON STROH T3N-R65W-S1 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON STROH T3N-R65W-S1 L01_FINAL PACKET // 065_SHELTON STROH T3N-R65W-S1 L01 TLO Final Packet	.pdf	6/1/2016 // 5/18/18	Work Request
SHELTON STROH T3N-R65W-S1 L01_FINAL PACKET // 065_SHELTON STROH T3N-R65W-S1 L01 TLO Final Packet	.pdf	6/1/2016 // 5/18/18	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHELTON STROH T3N-R65W-S1 L01_WALKDOWN	.pdf	6/1/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON STROH T3N-R65W-S1 L01_IR VERIFICATION	.pdf	5/31/2016	IR Verification Field Data Sheet
SHELTON STROH T3N-R65W-S1 L01_1001_NORMAL	.mp4	5/31/2016	IR Camera Video Normal Operations
SHELTON STROH T3N-R65W-S1 L01_1002_DUMP	.mp4	5/31/2016	IR Camera Video During Dump Event
SHELTON STROH T3N-R65W-S1 L01_1003_POST	.mp4	5/31/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHELTON STROH T3N-R65W-S1 L01_SIGNED EVAL	.pdf	7/15/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON STROH T3N-R65W-S1 L01**

Consent Decree Tank System Number: **692**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,511</b>	<b>7,511</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,740</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>25,201</b>	<b>25,201</b>	
Total VCS Capacity (scfh)	<b>28,941</b>	<b>29,754</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,430</b>	<b>22,243</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 11/17/2017  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/8/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON STROH T3N-R65W-S1 L01**

Consent Decree Tank System Number: **692**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

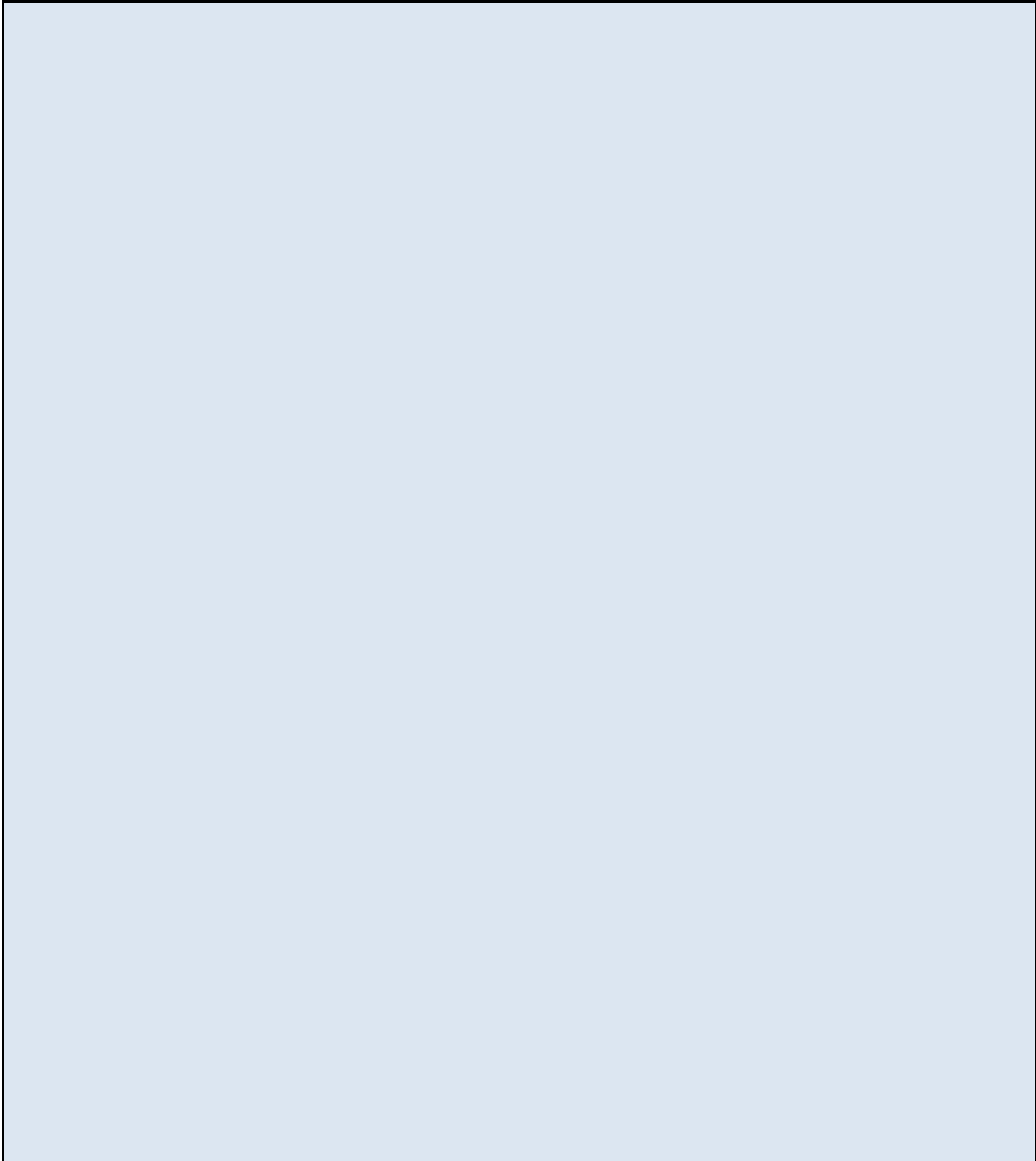
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,511</b>	<b>7,511</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON STROH T3N-R65W-S1 L01**

Consent Decree Tank System Number: **692**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHELTON T3N-R65W-S2 L01**

**Consent Decree Tank System Number:** **2171**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHELTON T3N-R65W-S2 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T3N-R65W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	4/7/2017	STEM Engineering Evaluation Spreadsheet
SHELTON T3N-R65W-S2 L01_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T3N-R65W-S2 L01_FINAL PACKET	.pdf	12/15/2016	Work Request
SHELTON T3N-R65W-S2 L01_FINAL PACKET	.pdf	2/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T3N-R65W-S2 L01_WALKDOWN	.pdf	3/17/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T3N-R65W-S2 L01_IR VERIFICATION	.pdf	3/17/2017	IR Verification Field Data Sheet
SHELTON T3N-R65W-S2 L01_1874_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SHELTON T3N-R65W-S2 L01_1875_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SHELTON T3N-R65W-S2 L01_1876_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T3N-R65W-S2 L01_SIGNED EVAL	.pdf	4/13/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHELTON T3N-R65W-S2 L01**

**Consent Decree Tank System Number:** **2171**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>1,694</b>	<b>1,694</b>	
Total VCS Capacity (scfh)	<b>5,692</b>	<b>6,652</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,387</b>	<b>3,346</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff  
 Audit Document Review Date: 11/14/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON T3N-R65W-S2 L01**

Consent Decree Tank System Number: **2171**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON T3N-R65W-S2 L01**

Consent Decree Tank System Number: 2171

**Audit Notes**

1. Process includes 2 HLPs in operation, however the Final Signed Evaluation notes that only one separator train can operate simultaneously. A response to a data request from Noble dated 11/14/2018 verifies that only 1 separator train can operate at a time.

This Tank system is selected for IR Camera Inspection because the IR footage of the post dump event shows a possible emission release.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHELTON T4N-R65W-S24 L01**

**Consent Decree Tank System Number:** **685**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S24 L01_STEM Engineering Evaluation_rev1	.xlsm	4/10/2017	STEM Engineering Evaluation Spreadsheet
SHELTON T4N-R65W-S24 L01_SIGNED EVAL	.pdf	4/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S24 L01_FINAL PACKET	.pdf	11/15/2016	Work Request
SHELTON T4N-R65W-S24 L01_FINAL PACKET	.pdf	2/27/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S24 L01_WALKDOWN	.pdf	4/3/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S24 L01_IR VERIFICATION	.pdf	4/3/2017	IR Verification Field Data Sheet
SHELTON T4N-R65W-S24 L01_1929_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SHELTON T4N-R65W-S24 L01_1930_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SHELTON T4N-R65W-S24 L01_1931_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S24 L01_SIGNED EVAL	.pdf	4/12/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON T4N-R65W-S24 L01**

Consent Decree Tank System Number: **685**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>8,779</b>	<b>8,781</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,145</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>22,214</b>	<b>22,214</b>	
Total VCS Capacity (scfh)	<b>26,359</b>	<b>26,814</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,580</b>	<b>18,033</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff  
 Audit Document Review Date: 7/26/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/4/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON T4N-R65W-S24 L01**

Consent Decree Tank System Number: **685**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	8,781	8,779

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON T4N-R65W-S24 L01**

Consent Decree Tank System Number: **685**

**Audit Notes**

The work request (p. 3 in final packet) states removal of 1 unused 270 psig HP separator from location. Pages 11 and 14 of the final packet show a total of three (3) separators on site (SN: R0019, R0054, and 8883). The job sheet (p. 21 in final packet) notes that only the 270 psig HP separator (8883) was removed which conflicts with p. 23 which indicates an additional separator (R0019) was removed from site. The final signed evaluation accounts for two separators dumping simultaneously. It is conservative to model two separators dumping simultaneously and thus is not a violation of the Modeling Guideline.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON T4N-R65W-S26 L03**

Consent Decree Tank System Number: **1301/1300**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
210_SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_FINAL PACKET	.pdf	11/14/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_STEM Engineering Evaluation_rev1	.xlsm	4/4/2017	STEM Engineering Evaluation Spreadsheet
SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_SIGNED EVAL	.pdf	4/10/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
210_SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_FINAL PACKET	.pdf	10/20/2016	Work Request
210_SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_FINAL PACKET	.pdf	2/13/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_WALKDOWN	.pdf	3/30/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_IR VERIFICATION	.pdf	3/30/2017	IR Verification Field Data Sheet
SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_1921_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_1923_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_1924_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHELTON T4N-R65W-S26 L03 & SHELTON T4N-R65W-S26 L01_SIGNED EVAL	.pdf	4/10/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHELTON T4N-R65W-S26 L03**

**Consent Decree Tank System Number:** **1301/1300**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,147</b>	<b>3,274</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,969</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>1,318</b>	<b>1,318</b>	
Total VCS Capacity (scfh)	<b>4,287</b>	<b>7,151</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,140</b>	<b>3,877</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff  
 Audit Document Review Date: 11/19/2018  
 Audit Document Review Verified by: Patrick Dilsaver & James Van Horne  
 Audit Document Verification Date: 11/28/2018 & 8/25/2020



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON T4N-R65W-S26 L03**

Consent Decree Tank System Number: **1301/1300**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	
scfh vapor/tank <sup>i</sup>	<b>317</b>	
Mscfd	<b>8</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>317</b>	<b>317</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,274</b>	<b>3,147</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON T4N-R65W-S26 L03**

Consent Decree Tank System Number: **1301/1300**

**Audit Notes**

1. The Work Request indicated the oil dump valves on the Separator were to be modified to Kimray 1400 with 1/2 inch trims. The trim size is confirmed by item A1 of the Walkdown Checklist. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.
2. The Work Request indicated the tank VOC line was to be changed to 3". Could not verify this work was done with the provided documentation. Noble provided verbal confirmation on 8/25/2020 that the VOC line was replaced with a 3" diameter pipe.
3. The tank system consists of a single oil tank. The signed evaluation states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.
4. This site was chosen at random for IR Camera Inspection.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON UPRR PAN AM T3N-R65W-S1 L01**

Consent Decree Tank System Number: **2295**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SHELTON UPRR PAN AM T3N-R65W-S1 L01_FINAL PACKET	.pdf	9/14/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SHELTON UPRR PAN AM T3N-R65W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	9/25/2017	STEM Engineering Evaluation Spreadsheet
SHELTON UPRR PAN AM T3N-R65W-S1 L01_SIGNED EVAL	.pdf	9/25/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SHELTON UPRR PAN AM T3N-R65W-S1 L01_FINAL PACKET	.pdf	9/14/2017	Work Request
SHELTON UPRR PAN AM T3N-R65W-S1 L01_FINAL PACKET	.pdf	9/14/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SHELTON UPRR PAN AM T3N-R65W-S1 L01_WALKDOWN	.pdf	9/12/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SHELTON UPRR PAN AM T3N-R65W-S1 L01_IR VERIFICATION	.pdf	9/12/2017	IR Verification Field Data Sheet
SHELTON UPRR PAN AM T3N-R65W-S1 L01_4740_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SHELTON UPRR PAN AM T3N-R65W-S1 L01_4741_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SHELTON UPRR PAN AM T3N-R65W-S1 L01_4742_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SHELTON UPRR PAN AM T3N-R65W-S1 L01_SIGNED EVAL	.pdf	9/25/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SHELTON UPRR PAN AM T3N-R65W-S1 L01

**Consent Decree Tank System Number:** 2295

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	55							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	3,068	3,069	0%
Calculated Burner Capacity (scfh)	4,027	4,958	
Headspace Surge Capacity (scfh)	0	0	
Total VCS Capacity (scfh)	4,027	4,958	
VCS Capacity minus PPIVF (scfh)	959	1,889	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard

Audit Document Review Date: 7/27/2018

Audit Document Review Verified by: Patrick Dilsaver

Audit Document Verification Date: 9/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON UPRR PAN AM T3N-R65W-S1 L01**

Consent Decree Tank System Number: **2295**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHELTON UPRR PAN AM T3N-R65W-S1 L01**

Consent Decree Tank System Number: **2295**

**Audit Notes**

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHOEMAKER T6N-R64W-S12 L02**

Consent Decree Tank System Number: **589**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L02_FINAL PACKET	.pdf	11/2/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SHOEMAKER T6N-R64W-S12 L02_SIGNED EVAL	.pdf	1/17/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L02_FINAL PACKET	.pdf	11/2/2015	Work Request
SHOEMAKER T6N-R64W-S12 L02_FINAL PACKET	.pdf	11/2/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L02_WALKDOWN	.pdf	10/29/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L02_IR VERIFICATION	.pdf	10/29/2015	IR Verification Field Data Sheet
SHOEMAKER T6N-R64W-S12 L02_0407_NORMAL	.mp4	10/29/2015	IR Camera Video Normal Operations
SHOEMAKER T6N-R64W-S12 L02_0408_DUMP	.mp4	10/29/2015	IR Camera Video During Dump Event
SHOEMAKER T6N-R64W-S12 L02_0409_POST	.mp4	10/29/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L02_SIGNED EVAL	.pdf	1/17/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHOEMAKER T6N-R64W-S12 L02**

Consent Decree Tank System Number: **589**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>400</b>	<b>400</b>	<b>70</b>			
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>			

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>26,692</b>	<b>35,229</b>	<b>32%</b>
Calculated Burner Capacity (scfh)	<b>6,587</b>	<b>9,106</b>	
Headspace Surge Capacity (scfh)	<b>60,898</b>	<b>60,898</b>	
Total VCS Capacity (scfh)	<b>67,485</b>	<b>70,004</b>	
VCS Capacity minus PPIVF (scfh)	<b>40,793</b>	<b>34,775</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHOEMAKER T6N-R64W-S12 L02**

Consent Decree Tank System Number: **589**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77	0.77					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	0.89	0.89	0.89					
Gas/Oil Ratio (scf/bbl)	112.8	112.8	112.8					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.80	0.80	0.80					
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20	12.20	12.20					
Critical Pressure (psia) <sup>b</sup>	539	539	539					
Vapor Pressure (psia) <sup>c</sup>	83	83	83					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85	0.85					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	1437	1437	1437					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	162.1	162.1	162.1					
Working Flow (Mscfd) <sup>h,i</sup>	14	14	14					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.80	0.80	0.80	0.80	0.80			
Valve Coefficient (gpm/psi) ( $C_v$ )	12.20	12.20	12.20	12.20	12.20			
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200			
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1			
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96			
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes			
Peak Flow (bwpd) <sup>f,g</sup>	3023	3023	6789	6789	3023			

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	12	12	27	27	12			
Working Flow (Mscfd) <sup>l</sup>	17	17	38	38	17			

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	34	6

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	20,258	13,505
Oil Tank Working Rate	1,708	1,136
Water Tank Flash Rate	3,774	3,270
Water Tank Working Rate	5,298	4,590
Tank Breathing Rate	1,664	1,664
Truck Loading Vapor	2,527	2,527
Total	35,229	26,692

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHOEMAKER T6N-R64W-S12 L02**

Consent Decree Tank System Number: **589**

**Audit Notes**

The Shoemaker A12-23D separator was not included in the Engineering Evaluation. There is no Work Request to remove it from service, and the Job Sheet did not indicate a separator was removed from service. The automation correspondence from 10/12/15 indicates the A12-23D wellhead is shutdown by the Master at 70 psi, indicating separator is still on location being fed by the well. The Field Data Sheets indicate dumps are produced to Tank 4, which is a tank connected to the VCS.

The Modeling Guidelines have not been correctly applied by leaving the oil and water separator dumps from this unit out of the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHOEMAKER T6N-R64W-S12 L03**

Consent Decree Tank System Number: **1963**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L03_FINAL PACKET // SHOEMAKER T6N-R64W-S12 L03_COMPLETED TLO	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L03_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SHOEMAKER T6N-R64W-S12 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L03_FINAL PACKET	.pdf	7/11/2018	Work Request
SHOEMAKER T6N-R64W-S12 L03_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets
SHOEMAKER T6N-R64W-S12 L03_COMPLETED TLO	.pdf	7/11/2018	TLO

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L03_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L03_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SHOEMAKER T6N-R64W-S12 L03_0390_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SHOEMAKER T6N-R64W-S12 L03_0391_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SHOEMAKER T6N-R64W-S12 L03_0392_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SHOEMAKER T6N-R64W-S12 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SHOEMAKER T6N-R64W-S12 L03**

**Consent Decree Tank System Number:** **1963**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>22,340</b>	<b>22,342</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,648</b>	<b>9,106</b>	
Headspace Surge Capacity (scfh)	<b>81,165</b>	<b>81,165</b>	
Total VCS Capacity (scfh)	<b>87,813</b>	<b>90,271</b>	
VCS Capacity minus PPIVF (scfh)	<b>65,473</b>	<b>67,929</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/13/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHOEMAKER T6N-R64W-S12 L03**

Consent Decree Tank System Number: **1963**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>11381</b>	<b>5068</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>46</b>	<b>20</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>64</b>	<b>28</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>17</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>2,741</b>	<b>2,741</b>
Water Tank Working Rate	<b>3,848</b>	<b>3,848</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>22,342</b>	<b>22,340</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SHOEMAKER T6N-R64W-S12 L03**

Consent Decree Tank System Number: **1963**

**Audit Notes**

N/A

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SIAN T6N-R65W-S27 L01**

Consent Decree Tank System Number: **1335**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SIAN T6N-R65W-S27 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SIAN T6N-R65W-S27 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SIAN T6N-R65W-S27 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SIAN T6N-R65W-S27 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SIAN T6N-R65W-S27 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SIAN T6N-R65W-S27 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SIAN T6N-R65W-S27 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SIAN T6N-R65W-S27 L01_0510_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SIAN T6N-R65W-S27 L01_0511_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SIAN T6N-R65W-S27 L01_0512_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SIAN T6N-R65W-S27 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SIAN T6N-R65W-S27 L01**

**Consent Decree Tank System Number:** **1335**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,554</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>394</b>	<b>394</b>	
Total VCS Capacity (scfh)	<b>3,948</b>	<b>4,947</b>	
VCS Capacity minus PPIVF (scfh)	<b>880</b>	<b>1,878</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SIAN T6N-R65W-S27 L01**

Consent Decree Tank System Number: **1335**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SIAN T6N-R65W-S27 L01**

Consent Decree Tank System Number: **1335**

**Audit Notes**

The stem work request form (PG 3 of Final Packet pdf) states for the pneumatic pshh to set the hlp hi/lo at no higher than 55 psig in the LP however nowhere in the job sheets (PGs 22-25) does it confirm this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 5), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 55 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SIEVERS T8N-R61W-S17 L01**

Consent Decree Tank System Number: **2050**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SIEVERS T8N-R61W-S17 L01_FINAL PACKET	.pdf	7/19/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SIEVERS T8N-R61W-S17 L01_STEM Engineering Evaluation_rev1	.xls	7/20/2017	STEM Engineering Evaluation Spreadsheet
SIEVERS T8N-R61W-S17 L01_Final Signed STEM Plan	.pdf	10/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SIEVERS T8N-R61W-S17 L01_FINAL PACKET	.pdf	7/19/2017	Work Request
SIEVERS T8N-R61W-S17 L01_FINAL PACKET	.pdf	7/19/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SIEVERS T8N-R61W-S17 L01_WALKDOWN	.pdf	7/19/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SIEVERS T8N-R61W-S17 L01_IR VERIFICATION	.pdf	7/19/2017	IR Verification Field Data Sheet
SIEVERS T8N-R61W-S17 L01_2146_NORMAL	.mp4	7/18/2017	IR Camera Video Normal Operations
SIEVERS T8N-R61W-S17 L01_2147_DUMP	.mp4	7/18/2017	IR Camera Video During Dump Event
SIEVERS T8N-R61W-S17 L01_2148_POST	.mp4	7/18/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SIEVERS T8N-R61W-S17 L01_SIGNED EVAL	.pdf	7/21/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SIEVERS T8N-R61W-S17 L01**

Consent Decree Tank System Number: **2050**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>22,815</b>	<b>22,818</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,716</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>94,125</b>	<b>94,125</b>	
Total VCS Capacity (scfh)	<b>97,841</b>	<b>98,678</b>	
VCS Capacity minus PPIVF (scfh)	<b>75,026</b>	<b>75,860</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 8/31/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SIEVERS T8N-R61W-S17 L01**

Consent Decree Tank System Number: **2050**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>11381</b>	<b>5068</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>46</b>	<b>20</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>64</b>	<b>28</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>2,741</b>	<b>2,741</b>
Water Tank Working Rate	<b>3,848</b>	<b>3,848</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>22,818</b>	<b>22,815</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SIEVERS T8N-R61W-S17 L01**

Consent Decree Tank System Number: **2050**

**Audit Notes**

The walkdown checklist is not marked complete  
CB - No additional information needed for this facility.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SINJIN LDS T6N-R65W-S36 L01**

Consent Decree Tank System Number: **80**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SINJIN LDS T6N-R65W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SINJIN LDS T6N-R65W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SINJIN LDS T6N-R65W-S36 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SINJIN LDS T6N-R65W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SINJIN LDS T6N-R65W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SINJIN LDS T6N-R65W-S36 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SINJIN LDS T6N-R65W-S36 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SINJIN LDS T6N-R65W-S36 L01_0792_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SINJIN LDS T6N-R65W-S36 L01_0793_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SINJIN LDS T6N-R65W-S36 L01_0794_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SINJIN LDS T6N-R65W-S36 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SINJIN LDS T6N-R65W-S36 L01**

Consent Decree Tank System Number: **80**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,273</b>	<b>7,274</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,945</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>22,134</b>	<b>22,134</b>	
Total VCS Capacity (scfh)	<b>25,079</b>	<b>27,967</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,806</b>	<b>20,694</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/13/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SINJIN LDS T6N-R65W-S36 L01**

Consent Decree Tank System Number: **80**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_r$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_r$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_r$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>7,274</b>	<b>7,273</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SINJIN LDS T6N-R65W-S36 L01**

Consent Decree Tank System Number: **80**

**Audit Notes**

The walkdown checklist (SINJIN LDS T6N-R65W-S36 L01\_WALKDOWN) was not marked as complete. Completion was verified through other documentation in the final packet (SINJIN LDS T6N-R65W-S36 L01\_FINAL PACKET).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SINJIN T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1209**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SINJIN T6N-R65W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SINJIN T6N-R65W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SINJIN T6N-R65W-S36 L01_SIGNED EVAL+	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SINJIN T6N-R65W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SINJIN T6N-R65W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SINJIN T6N-R65W-S36 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SINJIN T6N-R65W-S36 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SINJIN T6N-R65W-S36 L01_0520_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SINJIN T6N-R65W-S36 L01_0521_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SINJIN T6N-R65W-S36 L01_0522_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SINJIN T6N-R65W-S36 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SINJIN T6N-R65W-S36 L01**

**Consent Decree Tank System Number:** **1209**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,961</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>1,656</b>	<b>1,656</b>	
Total VCS Capacity (scfh)	<b>6,617</b>	<b>8,198</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,109</b>	<b>3,689</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/2/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/13/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SINJIN T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1209**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SINJIN T6N-R65W-S36 L01**

Consent Decree Tank System Number: **1209**

**Audit Notes**

The walkdown checklist (SINJIN T6N-R65W-S36 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (SINJIN T6N-R65W-S36 L01\_FINAL PACKET).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SKYWAY T5N-R67W-S11 L01**

Consent Decree Tank System Number: **2325**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L01_FINAL PACKET	.pdf	1/7/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	5/31/2017	STEM Engineering Evaluation Spreadsheet
SKYWAY T5N-R67W-S11 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L01_FINAL PACKET	.pdf	1/7/2016	Work Request
SKYWAY T5N-R67W-S11 L01_FINAL PACKET	.pdf	1/7/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L01_WALKDOWN	.pdf	1/7/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L01_IR VERIFICATION	.pdf	1/6/2016	IR Verification Field Data Sheet
SKYWAY T5N-R67W-S11 L01_0564_NORMAL	.mp4	1/5/2016	IR Camera Video Normal Operations
SKYWAY T5N-R67W-S11 L01_0565_DUMP	.mp4	1/5/2016	IR Camera Video During Dump Event
SKYWAY T5N-R67W-S11 L01_0568_POST	.mp4	1/5/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L01_SIGNED EVAL	.pdf	6/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SKYWAY T5N-R67W-S11 L01

**Consent Decree Tank System Number:** 2325

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	315
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 3/8"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	2,448	2,448	0%
Calculated Burner Capacity (scfh)	4,027	4,958	
Headspace Surge Capacity (scfh)	0	0	
Total VCS Capacity (scfh)	4,027	4,958	
VCS Capacity minus PPIVF (scfh)	1,579	2,510	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 11/17/2017  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/3/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SKYWAY T5N-R67W-S11 L01**

Consent Decree Tank System Number: **2325**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.91</b>							
Valve Coefficient (gpm/psi) (C)	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>431</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>48.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>315</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>250</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

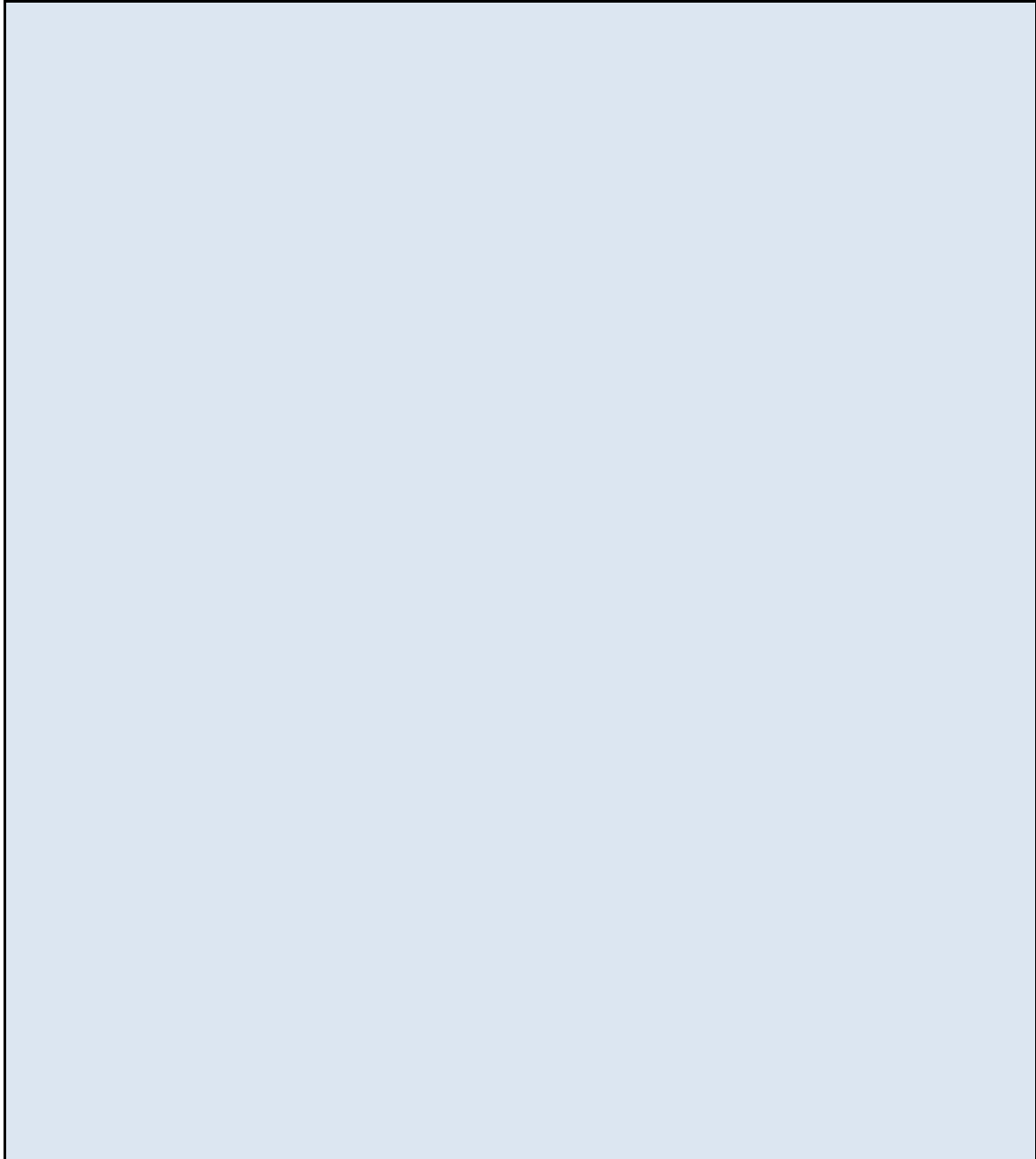
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,027</b>	<b>2,027</b>
Oil Tank Working Rate	<b>171</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>250</b>	<b>250</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,448</b>	<b>2,448</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SKYWAY T5N-R67W-S11 L01**

Consent Decree Tank System Number: **2325**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SKYWAY T5N-R67W-S11 L02**

Consent Decree Tank System Number: **2202**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L02_FINAL PACKET	.pdf	8/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L02_STEM Engineering Evaluation_rev1	.xlsm	8/18/2017	STEM Engineering Evaluation Spreadsheet
SKYWAY T5N-R67W-S11 L02_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L02_FINAL PACKET	.pdf	8/10/2017	Work Request
SKYWAY T5N-R67W-S11 L02_FINAL PACKET	.pdf	8/10/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L02_WALKDOWN	.pdf	8/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L02_IR VERIFICATION	.pdf	8/9/2017	IR Verification Field Data Sheet
SKYWAY T5N-R67W-S11 L02_2248_NORMAL	.mp4	8/8/2017	IR Camera Video Normal Operations
SKYWAY T5N-R67W-S11 L02_2249_DUMP	.mp4	8/8/2017	IR Camera Video During Dump Event
SKYWAY T5N-R67W-S11 L02_2250_POST	.mp4	8/8/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SKYWAY T5N-R67W-S11 L02_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SKYWAY T5N-R67W-S11 L02

**Consent Decree Tank System Number:** 2202

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,906</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>21,987</b>	<b>21,987</b>	
Total VCS Capacity (scfh)	<b>26,893</b>	<b>28,529</b>	
VCS Capacity minus PPIVF (scfh)	<b>22,147</b>	<b>23,782</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 5/18/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/13/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SKYWAY T5N-R67W-S11 L02**

Consent Decree Tank System Number: **2202**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SKYWAY T5N-R67W-S11 L02**

Consent Decree Tank System Number: **2202**

**Audit Notes**

The Walkdown checklist (SKYWAY T5N-R67W-S11 L02\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (SKYWAY T5N-R67W-S11 L02\_FINAL PACKET).

The Field Datasheet (SKYWAY T5N-R67W-S11 L02\_FINAL PACKET, p 13) confirms the oil tanks on site are 315 bbls. The signed eval (SKYWAY T5N-R67W-S11 L02\_SIGNED EVAL) lists the tanks as 300 bbls. The model was run using 300 bbl tanks to be conservative

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SLW GREEN VINCE ST T5N-R63W-S18 L01**

**Consent Decree Tank System Number:** **1989/1279**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SLW GREEN VINCE ST T5N-R63W-S18 L01_FINAL PACKET	.pdf	11/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SLW GREEN VINCE ST T5N-R64W-S18 L01_STEM Engineering Evaluation_rev1_with TLO_Oil	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SLW GREEN VINCE ST T5N-R63W-S18 L01_SIGNED EVAL (OIL)	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SLW GREEN VINCE ST T5N-R63W-S18 L01_FINAL PACKET	.pdf	11/30/2015	Work Request
SLW GREEN VINCE ST T5N-R63W-S18 L01_FINAL PACKET	.pdf	11/30/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SLW GREEN VINCE ST T5N-R63W-S18 L01_WALKDOWN	.pdf	11/23/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SLW GREEN VINCE ST T5N-R63W-S18 L01_IR VERIFICATION	.pdf	11/25/2015	IR Verification Field Data Sheet
SLW GREEN VINCE ST T5N-R63W-S18 L01_0468_NORMAL	.mp4	11/25/2015	IR Camera Video Normal Operations
SLW GREEN VINCE ST T5N-R63W-S18 L01_0469_DUMP	.mp4	11/25/2015	IR Camera Video During Dump Event
SLW GREEN VINCE ST T5N-R63W-S18 L01_0470_POST	.mp4	11/25/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SLW GREEN VINCE ST T5N-R63W-S18 L01_SIGNED EVAL (OIL)	.pdf	7/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW GREEN VINCE ST T5N-R63W-S18 L01**

Consent Decree Tank System Number: **1989/1279**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>4"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>35,732</b>	<b>36,214</b>	<b>1%</b>
Calculated Burner Capacity (scfh)	<b>3,834</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>153,625</b>	<b>289,668</b>	
Total VCS Capacity (scfh)	<b>157,459</b>	<b>294,221</b>	
VCS Capacity minus PPIVF (scfh)	<b>121,727</b>	<b>258,007</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/28/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW GREEN VINCE ST T5N-R63W-S18 L01**

Consent Decree Tank System Number: **1989/1279**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_r$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>57.00</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>6378</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>719.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>61</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_r$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_r$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>29,971</b>	<b>29,971</b>
Oil Tank Working Rate	<b>2,527</b>	<b>2,521</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>36,214</b>	<b>35,732</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW GREEN VINCE ST T5N-R63W-S18 L01**

Consent Decree Tank System Number: **1989/1279**

**Audit Notes**

The NEI evaluation only accounts for 3 oil tanks, 1 utilized as headspace. Per the Job Sheet and instruction on the marked up aerial, the SLW Green St. tanks were bottomed out (2 tanks in total) and connected to the Vince St VOC header (3 tanks in total).

The provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable the LP separator to produce into all tanks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW RNCH B01 ECONODE T5N-R64W-S12 L01**

Consent Decree Tank System Number: **2026**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_FINAL PACKET	.pdf	2/22/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_SIGNED EVAL	.pdf	1/2/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_WALKDOWN	.pdf	2/4/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_IR VERIFICATION	.pdf	2/18/2016	IR Verification Field Data Sheet
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_0709_NORMAL	.mp4	2/18/2016	IR Camera Video Normal Operations
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_0710_DUMP	.mp4	2/18/2016	IR Camera Video During Dump Event
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_0711_POST	.mp4	2/18/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B01 ECONODE T5N-R64W-S12 L01_SIGNED EVAL	.pdf	1/2/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW RNCH B01 ECONODE T5N-R64W-S12 L01**

Consent Decree Tank System Number: **2026**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>10</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>4</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>4 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>6 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	62-1HN LP	63-1HN LP	64-1HN LP	66-1HN LP	67-1HN LP	68-1HN LP	69-1HN LP	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	

<b>Water</b>	62,63,64-1HN LP	66,67-1HN LP	68,69-1HN LP	62,63,64-1HN HP	66,67-1HN HP	68,69-1HN HP	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>4</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>60,614</b>	<b>137,189</b>	<b>126%</b>
Calculated Burner Capacity (scfh)	<b>13,511</b>	<b>18,212</b>	
Headspace Surge Capacity (scfh)	<b>162,684</b>	<b>76,200</b>	
Total VCS Capacity (scfh)	<b>176,195</b>	<b>94,412</b>	
VCS Capacity minus PPIVF (scfh)	<b>115,581</b>	<b>-42,777</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien

Audit Document Review Date: 7/30/2018

Audit Document Review Verified by: Angela M. Oberlander

Audit Document Verification Date: 10/5/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW RNCH B01 ECONODE T5N-R64W-S12 L01**

Consent Decree Tank System Number: **2026**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02	
Z2	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	
Z3	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
Z	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9	22.9	22.9	22.9	22.9	

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77	0.77	0.77	0.77	
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25	21.25	
Critical Pressure (psia) <sup>b</sup>	833	833	833	833	833	833	833	
Vapor Pressure (psia) <sup>c</sup>	407	407	407	407	407	407	407	
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76	0.76	0.76	0.76	0.76	0.76	
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Peak Flow (bopd) <sup>f,g</sup>	6905	6905	6905	6905	6905	6905	6905	

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	158.2	158.2	158.2	158.2	158.2	158.2	158.2	
Working Flow (Mscfd) <sup>h,i</sup>	66	66	66	66	66	66	66	

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77	0.77	0.77		
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	34144	22763	22763	34144	22763	22763		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	137	91	91	137	91	91		
Working Flow (Mscfd) <sup>l</sup>	192	128	128	192	128	128		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>l</sup>	396	396
Mscfd	95	38

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	46,128	19,769
Oil Tank Working Rate	19,154	8,188
Water Tank Flash Rate	26,557	11,381
Water Tank Working Rate	37,276	15,975
Tank Breathing Rate	5,547	2,774
Truck Loading Vapor	2,527	2,527
Total	137,189	60,614

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW RNCH B01 ECONODE T5N-R64W-S12 L01**

Consent Decree Tank System Number: **2026**

**Audit Notes**

The Engineering Evaluation is completed with "doubled-up" or "tripled up" entries for the LP oil, HP water, and LP water dump rates. The peak dump rates correspond to a single separator dump rate and not rate which is "doubled-up" or "tripled up" as indicated on the Certification Report. Because the peak dump rates are underestimated, the Modeling Guideline has not been strictly applied.

The Engineering Evaluation did not include breathing losses from the non-production accepting tank bank. The facility configuration has two banks - one bank with five (5) oil tanks and two (2) water tanks, and another bank with five (5) oil tanks and two (2) water tanks. By excluding the breathing losses from the non-production accepting bank which continues to store oil, the correct application of the Modeling Guidelines cannot be verified.

When the STEM Engineering Evaluation spreadsheet was rerun with new parameters the headspace surge capacity was reduced to more than 1/2 the value in the signed evaluations. For this reason the engineering design standard is considered not to be strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW RNCH B12 ECONODE T5N-R64W-S12 L02**

Consent Decree Tank System Number: **2032**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_FINAL PACKET	.pdf	9/11/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_SIGNED EVAL	.pdf	1/17/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_FINAL PACKET	.pdf	9/11/2015	Work Request
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_FINAL PACKET	.pdf	9/11/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_WALKDOWN	.pdf	9/9/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_IR VERIFICATION	.pdf	9/10/2015	IR Verification Field Data Sheet
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_0256_NORMAL	.mp4	9/10/2015	IR Camera Video Normal Operations
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_0259_DUMP	.mp4	9/10/2015	IR Camera Video During Dump Event
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_0260_POST	.mp4	9/10/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SLW RNCH B12 ECONODE T5N-R64W-S12 L02_SIGNED EVAL	.pdf	1/17/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW RNCH B12 ECONODE T5N-R64W-S12 L02**

Consent Decree Tank System Number: **2032**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>14</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>3</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>4 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>6 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	12-62 LP	12-63 LP	12-64-1 LP	12-66 LP	12-67 LP	13-69-1 LP	12-79-1 LP	12-65,65-1 LP
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>

<b>Water</b>	12-62,63,64-1 LP	2-66,67, 13-69-1 LP	12-65,65-1,79-1 LP	12-62,63,64-1 HP	2-66,67, 13-69-1 H	12-65,65-1,79-1 HP	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>2</b>		
Man. Capacity (MSCFD)	<b>157</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>60,614</b>	<b>175,268</b>	<b>189%</b>
Calculated Burner Capacity (scfh)	<b>12,743</b>	<b>15,648</b>	
Headspace Surge Capacity (scfh)	<b>211,254</b>	<b>509,129</b>	
Total VCS Capacity (scfh)	<b>223,997</b>	<b>524,777</b>	
VCS Capacity minus PPIVF (scfh)	<b>163,383</b>	<b>349,509</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien

Audit Document Review Date: 7/31/2018

Audit Document Review Verified by: Angela M. Oberlander

Audit Document Verification Date: 10/7/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW RNCH B12 ECONODE T5N-R64W-S12 L02**

Consent Decree Tank System Number: **2032**

<b>Valko-McCain<sup>a</sup></b>	12-62 LP	12-63 LP	12-64-1 LP	12-66 LP	12-67 LP	13-69-1 LP	12-79-1 LP	12-65,65-1 LP
Z1	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02
Z2	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86
Z3	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Z	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9

<b>Peak Oil Flow</b>	12-62 LP	12-63 LP	12-64-1 LP	12-66 LP	12-67 LP	13-69-1 LP	12-79-1 LP	12-65,65-1 LP
Valve Press Recovery Factor ( $C_F$ )	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25	21.25	21.25
Critical Pressure (psia) <sup>b</sup>	833	833	833	833	833	833	833	833
Vapor Pressure (psia) <sup>c</sup>	407	407	407	407	407	407	407	407
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak Flow (bopd) <sup>f,g</sup>	6905	6905	6905	6905	6905	6905	6905	13811

<b>Oil Tank Flow Rates</b>	12-62 LP	12-63 LP	12-64-1 LP	12-66 LP	12-67 LP	13-69-1 LP	12-79-1 LP	12-65,65-1 LP
Flash Flow (Mscfd)	158.2	158.2	158.2	158.2	158.2	158.2	158.2	316.3
Working Flow (Mscfd) <sup>h,i</sup>	66	66	66	66	66	66	66	131

<b>Peak Water Flow</b>	12-62,63,64-1 LP	12-66,67, 13-69-1 LP	12-65,65-1,79-1 LP	12-62,63,64-1 HP	12-66,67, 13-69-1 HP	12-65,65-1,79-1 HP	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_F$ )	0.77	0.77	0.77	0.77	0.77	0.77		
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	34144	34144	34144	34144	34144	34144		

<b>Water Tank Flow Rates</b>	12-62,63,64-1 LP	12-66,67, 13-69-1 LP	12-65,65-1,79-1 LP	12-62,63,64-1 HP	12-66,67, 13-69-1 HP	12-65,65-1,79-1 HP	Vessel 7	Vessel 8
Flash Flow (Mscfd)	137	137	137	137	137	137		
Working Flow (Mscfd) <sup>l</sup>	192	192	192	192	192	192		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>l</sup>	396	396
Mscfd	133	29

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	59,308	19,769
Oil Tank Working Rate	24,626	8,188
Water Tank Flash Rate	34,144	11,381
Water Tank Working Rate	47,927	15,975
Tank Breathing Rate	6,736	2,774
Truck Loading Vapor	2,527	2,527
Total	175,268	60,614

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW RNCH B12 ECONODE T5N-R64W-S12 L02**

Consent Decree Tank System Number: **2032**

**Audit Notes**

The Engineering Evaluation is completed with "tripled up" entries for the LP oil, HP water, and LP water dump rates. The peak dump rates correspond to a single separator dump rate and not rate which is "tripled up" as indicated on the Certification Report. Because the peak dump rates are underestimated, the Modeling Guideline has not been strictly applied.

The Engineering Evaluation did not include breathing losses from the non-production accepting tank bank. The facility configuration has two banks - one bank with six (6) oil tanks and one (1) water tank, and another bank with eight (8) oil tanks and two (2) water tanks. By excluding the breathing losses from the non-production accepting bank which continues to store oil, the correct application of the Modeling Guidelines cannot be verified.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW ST PC T5N-R63W-S18 L01**

Consent Decree Tank System Number: **302**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SLW ST PC T5N-R63W-S18 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SLW ST PC T5N-R63W-S18 L01_STEM Engineering Evaluation_rev1_Oil; SLW ST PC T5N-R63W-S18	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SLW ST PC T5N-R63W-S18 L01_SIGNED EVAL_OIL VOC; SLW ST PC T5N-R63W-S18 L01_SIGNED EVAL_WATER VOC	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SLW ST PC T5N-R63W-S18 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SLW ST PC T5N-R63W-S18 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SLW ST PC T5N-R63W-S18 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SLW ST PC T5N-R63W-S18 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SLW ST PC T5N-R63W-S18 L01_0348_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SLW ST PC T5N-R63W-S18 L01_0349_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SLW ST PC T5N-R63W-S18 L01_0350_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SLW ST PC T5N-R63W-S18 L01_SIGNED EVAL_OIL VOC; SLW ST PC T5N-R63W-S18 L01_SIGNED EVAL_WATER	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW ST PC T5N-R63W-S18 L01**

Consent Decree Tank System Number: **302**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>10</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>4 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,989</b>	<b>17,179</b>	<b>7%</b>
Calculated Burner Capacity (scfh)	<b>3,824</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>24,047</b>	<b>24,047</b>	
Total VCS Capacity (scfh)	<b>27,871</b>	<b>28,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>11,882</b>	<b>11,421</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/25/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/17/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW ST PC T5N-R63W-S18 L01**

Consent Decree Tank System Number: **302**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>57</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>2,377</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>17,179</b>	<b>15,989</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW ST PC T5N-R63W-S18 L01**

Consent Decree Tank System Number: **302**

**Audit Notes**

The Tank System consists of 2 banks of 5 oil tanks each. The signed evaluation does not account for breathing losses from the non-producing bank. The modeling guideline has not been strictly applied.

The VCS for the water tanks is separate from the oil VCS so the water VCS does not have to be reviewed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW T5N-R64W-S10 L01**

Consent Decree Tank System Number: **1211**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SLW T5N-R64W-S10 L01_FINAL PACKET	.pdf	11/6/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SLW T5N-R64W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
SLW T5N-R64W-S10 L01_SIGNED EVAL	.pdf	7/20/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SLW T5N-R64W-S10 L01_FINAL PACKET	.pdf	11/6/2015	Work Request
SLW T5N-R64W-S10 L01_FINAL PACKET	.pdf	11/6/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SLW T5N-R64W-S10 L01_WALKDOWN	.pdf	11/6/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SLW T5N-R64W-S10 L01_IR VERIFICATION	.pdf	11/5/2015	IR Verification Field Data Sheet
SLW T5N-R64W-S10 L01_0426_NORMAL	.mp4	11/4/2015	IR Camera Video Normal Operations
SLW T5N-R64W-S10 L01_0427_DUMP	.mp4	11/4/2015	IR Camera Video During Dump Event
SLW T5N-R64W-S10 L01_0428_POST	.mp4	11/4/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SLW T5N-R64W-S10 L01_SIGNED EVAL	.pdf	7/20/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW T5N-R64W-S10 L01**

Consent Decree Tank System Number: **1211**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,365</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>343</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,708</b>	<b>6,542</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,264</b>	<b>3,097</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW T5N-R64W-S10 L01**

Consent Decree Tank System Number: **1211**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SLW T5N-R64W-S10 L01**

Consent Decree Tank System Number: **1211**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SMITH T7N-R64W-S18 L01**

Consent Decree Tank System Number: **1879**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SMITH T7N-R64W-S18 L01_FINAL PACKET	.pdf	2/9/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SMITH T7N-R64W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	2/9/2017	STEM Engineering Evaluation Spreadsheet
SMITH T7N-R64W-S18 L01_SIGNED EVAL	.pdf	2/13/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SMITH T7N-R64W-S18 L01_FINAL PACKET	.pdf	2/9/2017	Work Request
SMITH T7N-R64W-S18 L01_FINAL PACKET	.pdf	2/9/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SMITH T7N-R64W-S18 L01_WALKDOWN	.pdf	2/8/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SMITH T7N-R64W-S18 L01_IR VERIFICATION	.pdf	2/8/2017	IR Verification Field Data Sheet
SMITH T7N-R64W-S18 L01_0108_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SMITH T7N-R64W-S18 L01_0109_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SMITH T7N-R64W-S18 L01_0111_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SMITH T7N-R64W-S18 L01_SIGNED EVAL	.pdf	2/13/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SMITH T7N-R64W-S18 L01**

**Consent Decree Tank System Number:** **1879**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,571</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>2,813</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>2,813</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>377</b>	<b>3,262</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/27/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SMITH T7N-R64W-S18 L01**

Consent Decree Tank System Number: **1879**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>458</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>51.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,152</b>	<b>2,027</b>
Oil Tank Working Rate	<b>181</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,571</b>	<b>2,436</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SMITH T7N-R64W-S18 L01**

Consent Decree Tank System Number: **1879**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 19) indicates a new separator was installed onsite and ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 26) is checked "yes" indicating the oil dump trim is consistent with the Engineering Evaluation, and is therefore 3/8". There is no indication of the oil dump valve size installed in the separator onsite.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the LP separator. For the given trim size, 3/8", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SMITS HAREN T4N-R66W-S16 L01**

Consent Decree Tank System Number: **178**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SMITS HAREN T4N-R66W-S16 L01_FINAL PACKET	.pdf	7/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SMITS HAREN T4N-R66W-S16 L01_STEM Engineering Evaluation_rev1	.xslm	7/22/2016	STEM Engineering Evaluation Spreadsheet
SMITS HAREN T4N-R66W-S16 L01_Final Signed STEM Plan	.pdf	10/19/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SMITS HAREN T4N-R66W-S16 L01_FINAL PACKET	.pdf	7/26/2016	Work Request
SMITS HAREN T4N-R66W-S16 L01_FINAL PACKET	.pdf	7/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SMITS HAREN T4N-R66W-S16 L01_WALKDOWN	.pdf	7/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SMITS HAREN T4N-R66W-S16 L01_IR VERIFICATION	.pdf	7/21/2016	IR Verification Field Data Sheet
SMITS HAREN T4N-R66W-S16 L01_1309_NORMAL	.mp4	7/20/2016	IR Camera Video Normal Operations
SMITS HAREN T4N-R66W-S16 L01_1310_DUMP	.mp4	7/20/2016	IR Camera Video During Dump Event
SMITS HAREN T4N-R66W-S16 L01_1311_POST	.mp4	7/20/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SMITS HAREN T4N-R66W-S16 L01_SIGNED EVAL	.pdf	7/26/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SMITS HAREN T4N-R66W-S16 L01

**Consent Decree Tank System Number:** 178

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,726</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,767</b>	<b>2,767</b>	
Total VCS Capacity (scfh)	<b>5,493</b>	<b>8,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,812</b>	<b>4,918</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 12/27/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 3/30/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SMITS HAREN T4N-R66W-S16 L01**

Consent Decree Tank System Number: **178**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C)	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>j</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SMITS HAREN T4N-R66W-S16 L01**

Consent Decree Tank System Number: **178**

**Audit Notes**

-The walkdown checklist was not marked complete. Modifications were confirmed using other documentation.

-The construction job sheet (SMITS HAREN T4N-R66W-S16 L01\_FINAL PACKET page 23) states that the PSHH was set to 50 psig. The QC Stem Checkout (SMITS HAREN T4N-R66W-S16 L01\_FINAL PACKET page 22) states that the PSHH was set to 60 psig. The QC Stem Checkout was completed on 6/8/2016 after the construction ended 5/26/2016. The PSHH set point from the QC Stem Checkout was used in these calculations because it was confirmed to be after the construction ended and results in a higher PPIVFR than the confirmed set point in the construction job sheet. 60 psig also matches the value used in the signed evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SOONER ST T5N-R64W-S36 L01**

Consent Decree Tank System Number: **1938**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SOONER ST T5N-R64W-S36 L01_FINAL PACKET	.pdf	6/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SOONER ST T5N-R64W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	4/15/2016	STEM Engineering Evaluation Spreadsheet
SOONER ST T5N-R64W-S36 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SOONER ST T5N-R64W-S36 L01_FINAL PACKET	.pdf	6/11/2018	Work Request
SOONER ST T5N-R64W-S36 L01_FINAL PACKET	.pdf	6/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SOONER ST T5N-R64W-S36 L01_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SOONER ST T5N-R64W-S36 L01_IR VERIFICATION	.pdf	4/15/2016	IR Verification Field Data Sheet
SOONER ST T5N-R64W-S36 L01_0860_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SOONER ST T5N-R64W-S36 L01_0861_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SOONER ST T5N-R64W-S36 L01_0862_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SOONER ST T5N-R64W-S36 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SOONER ST T5N-R64W-S36 L01**

**Consent Decree Tank System Number:** **1938**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,350</b>	<b>2,350</b>	
Total VCS Capacity (scfh)	<b>5,277</b>	<b>8,183</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,596</b>	<b>4,501</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 10/1/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SOONER ST T5N-R64W-S36 L01**

Consent Decree Tank System Number: **1938**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SOONER ST T5N-R64W-S36 L01**

Consent Decree Tank System Number: **1938**

**Audit Notes**

The walkdown checklist (SOONER ST T5N-R64W-S36 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (SOONER ST T5N-R64W-S36 L01\_FINAL PACKET).

The STEM model (SOONER ST T5N-R64W-S36 L01\_STEM Engineering Evaluation\_rev1) was run with 2 oil tanks. The signed evaluation (SOONER ST T5N-R64W-S36 L01\_SIGNED EVAL, p 2) also only has 2 tanks on site. However, the field datasheet (SOONER ST T5N-R64W-S36 L01\_FINAL PACKET, p 12) says there are 3 tanks on site. STEM work request (SOONER ST T5N-R64W-S36 L01\_FINAL PACKET, p 12) states "Note: Aerial shows 3 tanks, but Production is planning to pull one to use on a legacy vertical battery." Walkdown checklist indicates there are only 2 tanks on site.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SOUTHARD T6N-R66W-S12 L01**

Consent Decree Tank System Number: **802**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SOUTHARD T6N-R66W-S12 L01_FINAL PACKET	.pdf	2/3/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SOUTHARD T6N-R66W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
SOUTHARD T6N-R66W-S12 L01_Final Signed STEM Plan	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SOUTHARD T6N-R66W-S12 L01_FINAL PACKET	.pdf	2/3/2016	Work Request
SOUTHARD T6N-R66W-S12 L01_FINAL PACKET	.pdf	2/3/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SOUTHARD T6N-R66W-S12 L01_WALKDOWN	.pdf	2/3/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SOUTHARD T6N-R66W-S12 L01_IR VERIFICATION	.pdf	2/3/2016	IR Verification Field Data Sheet
SOUTHARD T6N-R66W-S12 L01_0650_NORMAL	.mp4	2/1/2016	IR Camera Video Normal Operations
SOUTHARD T6N-R66W-S12 L01_0651_DUMP	.mp4	2/1/2016	IR Camera Video During Dump Event
SOUTHARD T6N-R66W-S12 L01_0652_POST	.mp4	2/1/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SOUTHARD T6N-R66W-S12 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SOUTHARD T6N-R66W-S12 L01**

Consent Decree Tank System Number: **802**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,063</b>	<b>2,063</b>	
Total VCS Capacity (scfh)	<b>6,244</b>	<b>6,663</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,736</b>	<b>2,154</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess

Audit Document Review Date: 5/14/2018

Audit Document Review Verified by: Jesse Hanshaw

Audit Document Verification Date: 11/15/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SOUTHARD T6N-R66W-S12 L01**

Consent Decree Tank System Number: **802**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SOUTHARD T6N-R66W-S12 L01**

Consent Decree Tank System Number: **802**

**Audit Notes**

The walkdown checklist is not marked complete

The stem work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 21-23 of the Final Packet) does it confirm this task was completed

**NOBLE REQUEST:**

Field verification for this facility was completed on or around 1/19/2016, field verification confirmed that the 3" VOC line from the tank to the KO pot was installed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPAUR USX T7N-R64W-S33 L01**

Consent Decree Tank System Number: **1909**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SPAUR USX T7N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SPAUR USX T7N-R64W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPAUR USX T7N-R64W-S33 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SPAUR USX T7N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPAUR USX T7N-R64W-S33 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SPAUR USX T7N-R64W-S33 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SPAUR USX T7N-R64W-S33 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPAUR USX T7N-R64W-S33 L01_0881_Normal	.mp4	7/11/2018	IR Camera Video Normal Operations
SPAUR USX T7N-R64W-S33 L01_0882_Dump	.mp4	7/11/2018	IR Camera Video During Dump Event
SPAUR USX T7N-R64W-S33 L01_0883_Post	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SPAUR USX T7N-R64W-S33 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SPAUR USX T7N-R64W-S33 L01

**Consent Decree Tank System Number:** 1909

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>2,431</b>	<b>2,431</b>	
Total VCS Capacity (scfh)	<b>5,358</b>	<b>8,264</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,677</b>	<b>4,582</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/26/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/28/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPAUR USX T7N-R64W-S33 L01**

Consent Decree Tank System Number: **1909**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

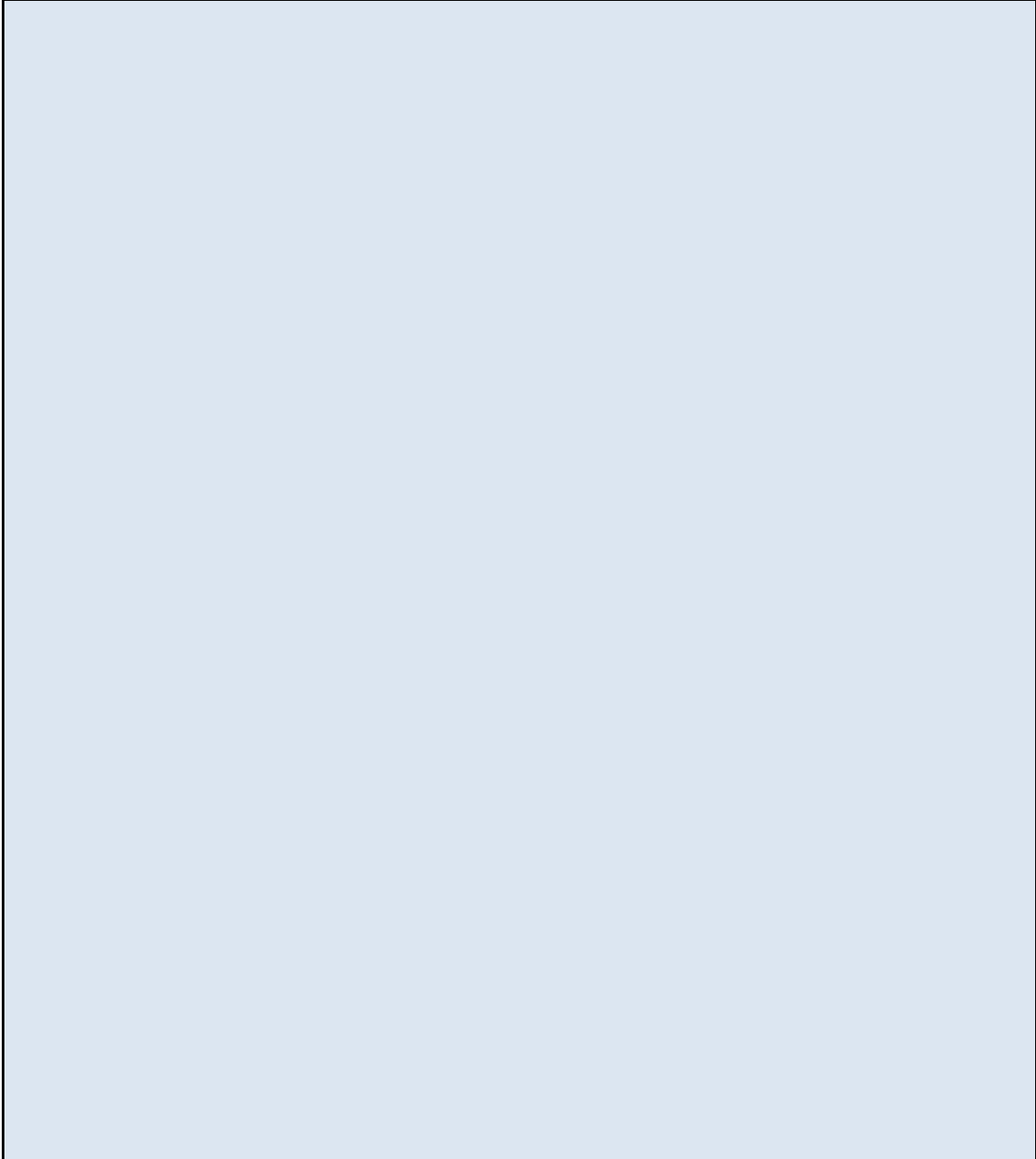
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPAUR USX T7N-R64W-S33 L01**

Consent Decree Tank System Number: **1909**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is a light blue color.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2293**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/7/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SPAYD T4N-R65W-S29 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	6/22/2017	STEM Engineering Evaluation Spreadsheet
SPAYD T4N-R65W-S29 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/7/2016	Work Request
SPAYD T4N-R65W-S29 L01_FINAL PACKET	.pdf	9/7/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SPAYD T4N-R65W-S29 L01_WALKDOWN	.pdf	9/2/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SPAYD T4N-R65W-S29 L01_IR VERIFICATION	.pdf	9/2/2016	IR Verification Field Data Sheet
SPAYD T4N-R65W-S29 L01_1468_NORMAL	.mp4	9/2/2016	IR Camera Video Normal Operations
SPAYD T4N-R65W-S29 L01_1469_DUMP	.mp4	9/2/2016	IR Camera Video During Dump Event
SPAYD T4N-R65W-S29 L01_1470_POST	.mp4	9/2/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SPAYD T4N-R65W-S29 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SPAYD T4N-R65W-S29 L01**

**Consent Decree Tank System Number:** **2293**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,828</b>	<b>8,008</b>	<b>2%</b>
Calculated Burner Capacity (scfh)	<b>4,110</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>33,521</b>	<b>33,521</b>	
Total VCS Capacity (scfh)	<b>37,631</b>	<b>38,121</b>	
VCS Capacity minus PPIVF (scfh)	<b>29,803</b>	<b>30,113</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 5/29/2018  
 Audit Document Review Verified by: \_\_\_\_\_ Patrick Dilsaver  
 Audit Document Verification Date: \_\_\_\_\_ 9/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2293**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>317</b>	<b>0</b>
Mscfd	<b>30</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,268</b>	<b>1,268</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>8,008</b>	<b>7,828</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPAYD T4N-R65W-S29 L01**

Consent Decree Tank System Number: **2293**

**Audit Notes**

**STEM Walkdown Checklist**

ITEM C13 on the STEM Walkdown Checklist (Final Packet, pg 9) is checked "yes" indicating the LP separator onsite can produce into all tanks. The Jobsheet (Final Packet, pg 23) indicates an oil tank was bottomed out and is now being used as a vapor surge vessel. ITEM C13 is incorrectly checked "yes" as the LP separator can not produce into all tanks onsite.

**Oil Dump Valve Size - Unknown**

Job Sheet (Final Packet, pg 23) indicates a new LP separator which dumps to the tanks was installed onsite with an unknown oil dump valve size and trim size. ITEM A1 of the STEM Walkdown Checklist is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation and is therefore 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the LP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SPIKE ELISE ST T4N-R64W-S24 L03

**Consent Decree Tank System Number:** 494 / 1923

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_1077_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_1078_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_1079_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SPIKE ELISE ST T4N-R64W-S24 L03

**Consent Decree Tank System Number:** 494 / 1923

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,222</b>	<b>5,222</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,646</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>27,092</b>	<b>27,092</b>	
Total VCS Capacity (scfh)	<b>29,738</b>	<b>32,925</b>	
VCS Capacity minus PPIVF (scfh)	<b>24,516</b>	<b>27,703</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 8/8/2018  
 Audit Document Review Verified by: Craig Bock & James Van Horne  
 Audit Document Verification Date: 9/14/2018 & 8/25/2020



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE ELISE ST T4N-R64W-S24 L03**

Consent Decree Tank System Number: **494 / 1923**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,222</b>	<b>5,222</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE ELISE ST T4N-R64W-S24 L03**

Consent Decree Tank System Number: **494 / 1923**

**Audit Notes**

The work request (final packet, pg. 5) requests that two tanks be converted to headspace tanks. No documentation was provided to confirm this was completed. Noble provided verbal confirmation that two tanks were converted to headspace tanks on 8/25/2020.

The work request (final packet, pg. 5) requests that the below ground line be converted to a 4 inch above ground line. No documentation was provided to confirm this was completed but an above ground line is visible in the IR Camera videos.

The work request (final packet, pg. 5) requests that the unused Tornado burner be removed. No documentation was provided to confirm this was completed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SPIKE ELISE ST T4N-R64W-S24 L03  
**Consent Decree Tank System Number:** 494 / 1923

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_1077_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_1078_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_1079_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ELISE ST T4N-R64W-S24 L03 & ST T4N-R64W-S24 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SPIKE ELISE ST T4N-R64W-S24 L03

**Consent Decree Tank System Number:** 494 / 1923

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	5
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	5,222	5,222	0%
Calculated Burner Capacity (scfh)	2,646	5,833	
Headspace Surge Capacity (scfh)	27,092	8,578	
Total VCS Capacity (scfh)	29,738	14,411	
VCS Capacity minus PPIVF (scfh)	24,516	9,189	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 8/8/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE ELISE ST T4N-R64W-S24 L03**

Consent Decree Tank System Number: **494 / 1923**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,222</b>	<b>5,222</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE ELISE ST T4N-R64W-S24 L03**

Consent Decree Tank System Number: **494 / 1923**

**Audit Notes**

The work request (final packet, pg. 5) requests that two tanks be converted to headspace tanks. No documentation was provided to confirm this was completed. It is unknown if the engineering design standard was strictly followed in this case.

The work request (final packet, pg. 5) requests that the below ground line be converted to a 4 inch above ground line. No documentation was provided to confirm this was completed but an above ground line is visible in the IR Camera videos.

The work request (final packet, pg. 5) requests that the unused Tornado burner be removed. No documentation was provided to confirm this was completed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01**

Consent Decree Tank System Number: **530**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_1369_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_1370_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_1371_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01**

**Consent Decree Tank System Number:** **530**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>22,841</b>	<b>22,841</b>	
Total VCS Capacity (scfh)	<b>26,212</b>	<b>27,441</b>	
VCS Capacity minus PPIVF (scfh)	<b>21,466</b>	<b>22,694</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/25/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01**

Consent Decree Tank System Number: **530**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	792							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,720	3,720
Oil Tank Working Rate	314	313
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	4,747	4,746

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE GUTTERSEN GWS ST DIGGIN T3N-R64W-S16 L01**

Consent Decree Tank System Number: **530**

**Audit Notes**

The stem work request (PG 3 of Final Packet pdf) states to disconnect tank #3 from the fill header, but leave connected to the VOC header to be used for headspace however nowhere in the job sheets (PGs 21-26 of Final Packet pdf) does it state this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 2/6/2017, field verification confirmed that one tank was converted to a headspace tank."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE GUTTERSEN ST T3N-R64W-S12 L01**

Consent Decree Tank System Number: **1221**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_0037_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_0039_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_0040_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S12 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SPIKE GUTTERSEN ST T3N-R64W-S12 L01**

**Consent Decree Tank System Number:** **1221**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>400</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,523</b>	<b>3,524</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>579</b>	<b>579</b>	
Total VCS Capacity (scfh)	<b>4,799</b>	<b>5,179</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,276</b>	<b>1,655</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE GUTTERSEN ST T3N-R64W-S12 L01**

Consent Decree Tank System Number: **1221**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>400</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>317</b>	<b>0</b>
Mscfd	<b>8</b>	<b>0</b>

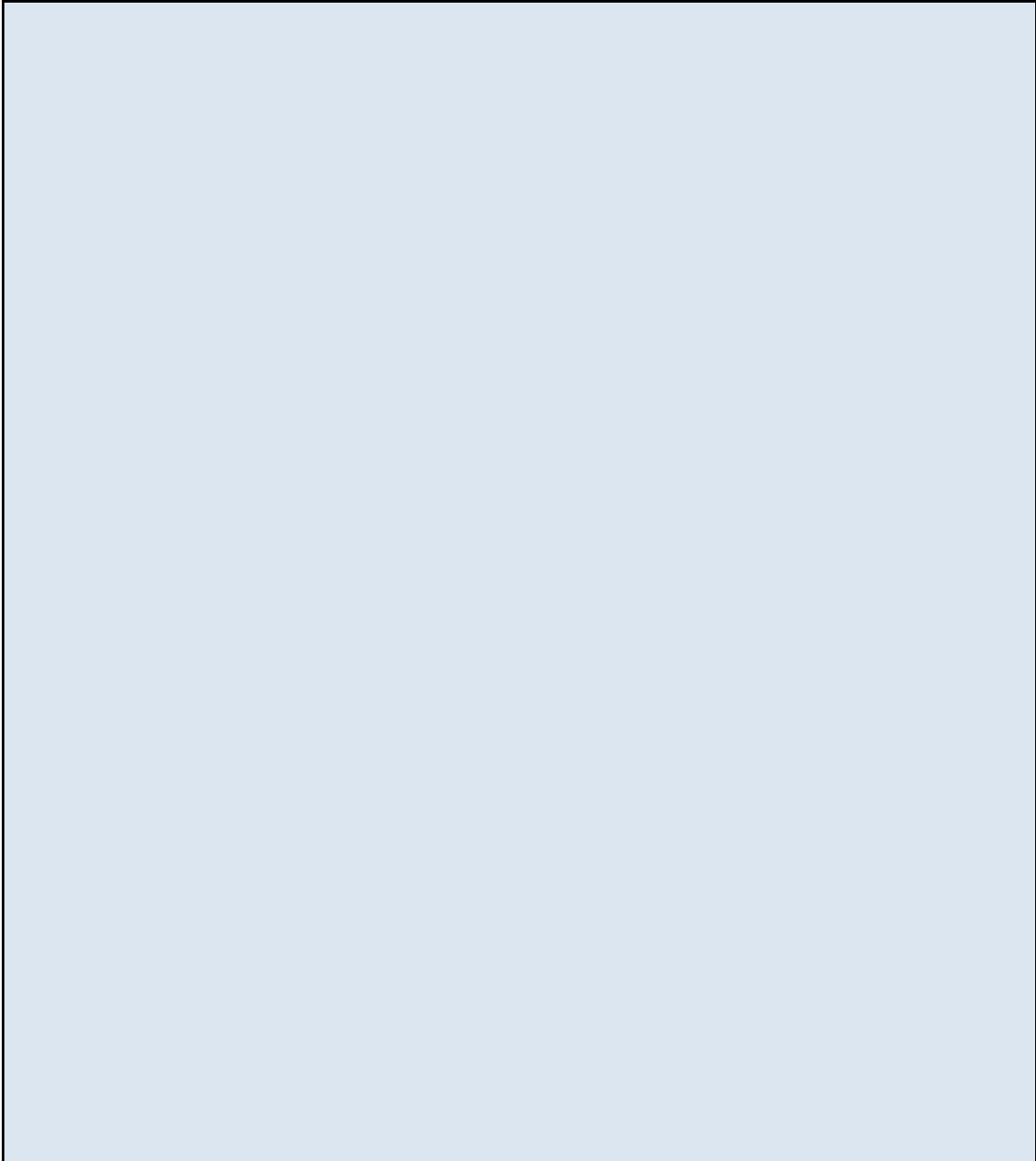
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>317</b>	<b>317</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,524</b>	<b>3,523</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE GUTTERSEN ST T3N-R64W-S12 L01**

Consent Decree Tank System Number: **1221**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE GUTTERSEN ST T3N-R64W-S14 L01**

Consent Decree Tank System Number: **560**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_1408_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_1409_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_1410_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SPIKE GUTTERSEN ST T3N-R64W-S14 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SPIKE GUTTERSEN ST T3N-R64W-S14 L01**

**Consent Decree Tank System Number:** **560**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,431</b>	<b>1,431</b>	
Total VCS Capacity (scfh)	<b>5,612</b>	<b>6,031</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,530</b>	<b>1,948</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE GUTTERSEN ST T3N-R64W-S14 L01**

Consent Decree Tank System Number: **560**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** SPIKE GUTTERSEN ST T3N-R64W-S14 L01

**Consent Decree Tank System Number:** 560

**Audit Notes**

The stem work request (PG 4 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 26-30 of the Final Packet) does it confirm this task was completed  
Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 1/30/2018, field verification confirmed that the 3" VOC line from the tank to the KO was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE JIGGER ST T4N-R63W-S30 L01**

Consent Decree Tank System Number: **1222**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
SPIKE JIGGER ST T4N-R63W-S30 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
SPIKE JIGGER ST T4N-R63W-S30 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPIKE JIGGER ST T4N-R63W-S30 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
SPIKE JIGGER ST T4N-R63W-S30 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPIKE JIGGER ST T4N-R63W-S30 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
SPIKE JIGGER ST T4N-R63W-S30 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
SPIKE JIGGER ST T4N-R63W-S30 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPIKE JIGGER ST T4N-R63W-S30 L01_2310_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SPIKE JIGGER ST T4N-R63W-S30 L01_2311_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SPIKE JIGGER ST T4N-R63W-S30 L01_2312_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
SPIKE JIGGER ST T4N-R63W-S30 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE JIGGER ST T4N-R63W-S30 L01**

Consent Decree Tank System Number: **1222**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,123</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>134</b>	<b>134</b>	
Total VCS Capacity (scfh)	<b>4,257</b>	<b>4,734</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,189</b>	<b>1,665</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/24/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE JIGGER ST T4N-R63W-S30 L01**

Consent Decree Tank System Number: **1222**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

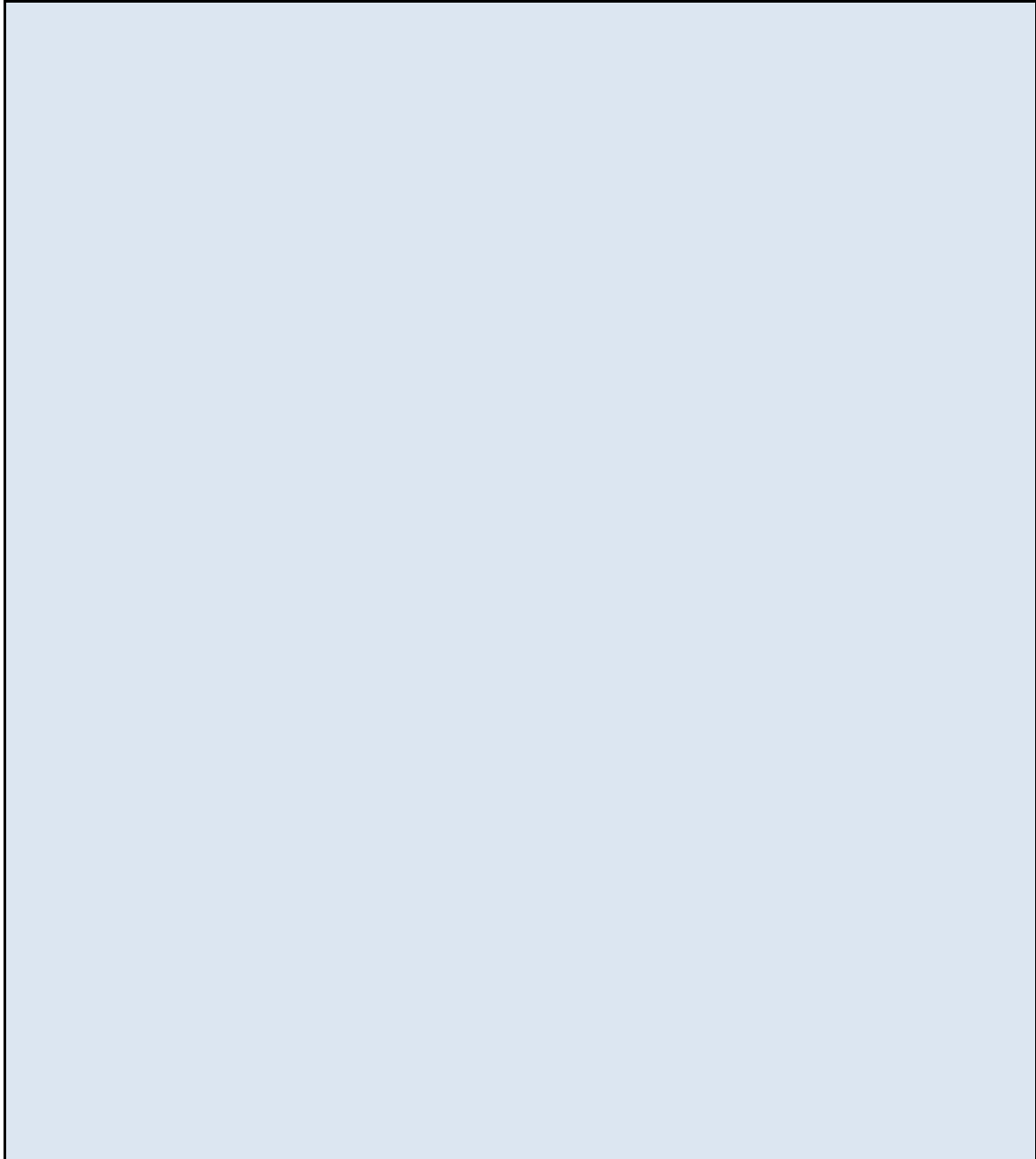
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE JIGGER ST T4N-R63W-S30 L01**

Consent Decree Tank System Number: **1222**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE ST T3N-R63W-S20 L01**

Consent Decree Tank System Number: **1219**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SPIKE ST T3N-R63W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ST T3N-R63W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPIKE ST T3N-R63W-S20 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ST T3N-R63W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPIKE ST T3N-R63W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ST T3N-R63W-S20 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ST T3N-R63W-S20 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPIKE ST T3N-R63W-S20 L01_2297_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SPIKE ST T3N-R63W-S20 L01_2298_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SPIKE ST T3N-R63W-S20 L01_2299_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SPIKE ST T3N-R63W-S20 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SPIKE ST T3N-R63W-S20 L01**

**Consent Decree Tank System Number:** **1219**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,436</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,176</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,176</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>740</b>	<b>2,164</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/24/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE ST T3N-R63W-S20 L01**

Consent Decree Tank System Number: **1219**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>431</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>48.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

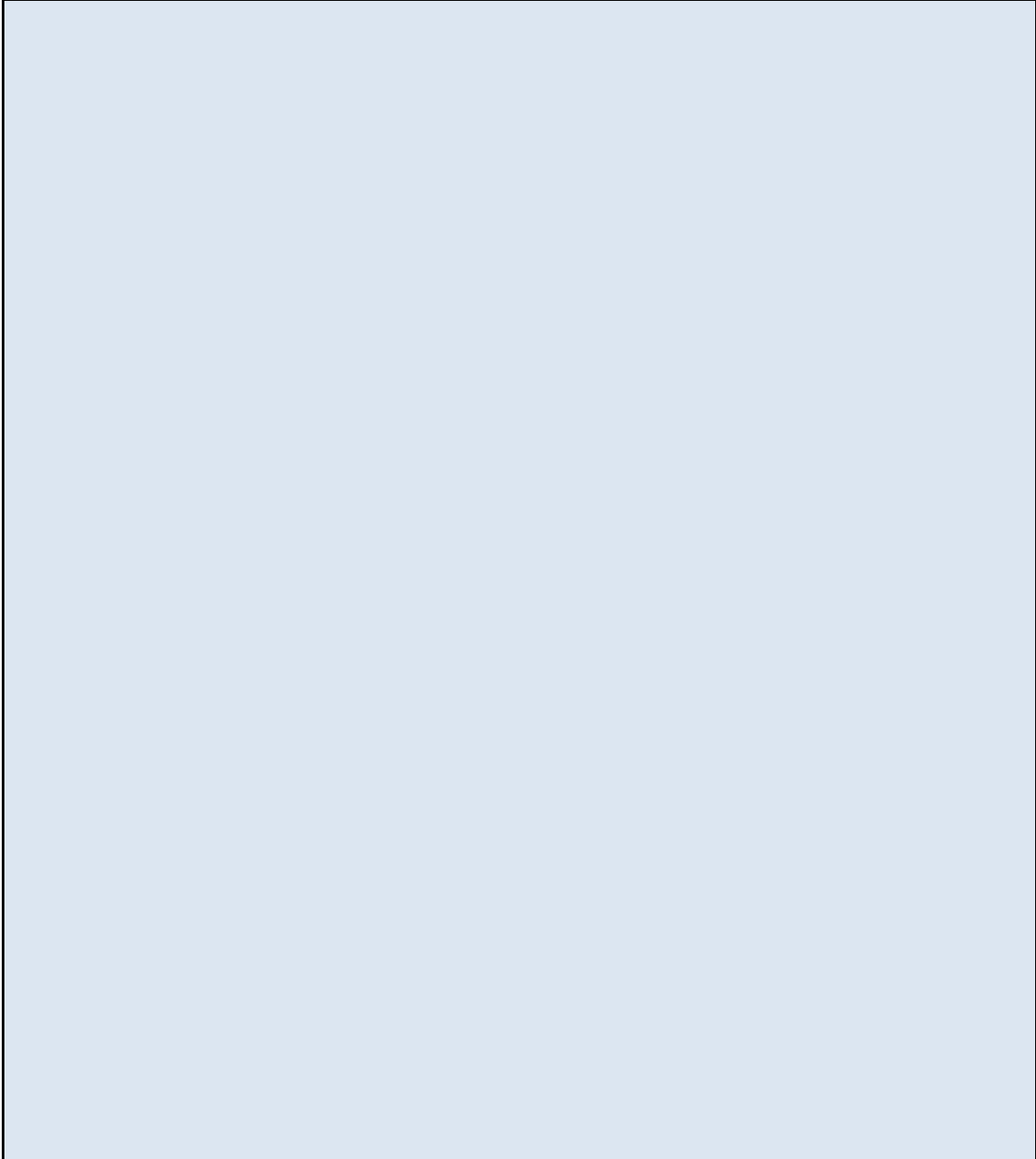
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,027</b>	<b>2,027</b>
Oil Tank Working Rate	<b>171</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,436</b>	<b>2,436</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE ST T3N-R63W-S20 L01**

Consent Decree Tank System Number: **1219**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE VOLLEY ST T3N-R64W-S10 L01**

Consent Decree Tank System Number: **1218**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SPIKE VOLLEY ST T3N-R64W-S10 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SPIKE VOLLEY ST T3N-R64W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
SPIKE VOLLEY ST T3N-R64W-S10 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE VOLLEY ST T3N-R64W-S10 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
SPIKE VOLLEY ST T3N-R64W-S10 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SPIKE VOLLEY ST T3N-R64W-S10 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SPIKE VOLLEY ST T3N-R64W-S10 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
SPIKE VOLLEY ST T3N-R64W-S10 L01_1947_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SPIKE VOLLEY ST T3N-R64W-S10 L01_1948_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SPIKE VOLLEY ST T3N-R64W-S10 L01_1949_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SPIKE VOLLEY ST T3N-R64W-S10 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SPIKE VOLLEY ST T3N-R64W-S10 L01**

**Consent Decree Tank System Number:** **1218**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>422</b>	<b>422</b>	
Total VCS Capacity (scfh)	<b>4,449</b>	<b>5,380</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,005</b>	<b>1,936</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/26/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE VOLLEY ST T3N-R64W-S10 L01**

Consent Decree Tank System Number: **1218**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SPIKE VOLLEY ST T3N-R64W-S10 L01**

Consent Decree Tank System Number: **1218**

**Audit Notes**

The stem work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 22-26 of the Final Packet) does it confirm this task was completed

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 3/1/2017, field verification confirmed that the 3" VOC line from the tank to the KO was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST BOOTH T7N-R65W-S36 L04**

Consent Decree Tank System Number: **1720**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ST BOOTH T7N-R65W-S36 L04_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ST BOOTH T7N-R65W-S36 L04_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
ST BOOTH T7N-R65W-S36 L04_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ST BOOTH T7N-R65W-S36 L04_FINAL PACKET	.pdf	7/11/2018	Work Request
ST BOOTH T7N-R65W-S36 L04_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ST BOOTH T7N-R65W-S36 L04_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ST BOOTH T7N-R65W-S36 L04_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
ST BOOTH T7N-R65W-S36 L04_4699_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
ST BOOTH T7N-R65W-S36 L04_4700_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
ST BOOTH T7N-R65W-S36 L04_4701_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ST BOOTH T7N-R65W-S36 L04_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST BOOTH T7N-R65W-S36 L04**

Consent Decree Tank System Number: **1720**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,957</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>11,303</b>	<b>11,303</b>	
Total VCS Capacity (scfh)	<b>14,260</b>	<b>17,136</b>	
VCS Capacity minus PPIVF (scfh)	<b>10,955</b>	<b>13,830</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST BOOTH T7N-R65W-S36 L04**

Consent Decree Tank System Number: **1720**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST BOOTH T7N-R65W-S36 L04**

Consent Decree Tank System Number: **1720**

**Audit Notes**

Emissions were observed on the tank furthest away from the equipment on site during the dump video.  
Emissions appear to be coming from the their hatch on top of tank

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST T4N-R64W-S36 L01**

Consent Decree Tank System Number: **500/804**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_FINAL PACKET	.pdf	4/24/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_STEM Engineering Evaluation_rev1	.xlsm	4/29/2016	STEM Engineering Evaluation Spreadsheet
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_SIGNED EVAL	.pdf	5/4/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_FINAL PACKET	.pdf	4/24/2016	Work Request
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_FINAL PACKET	.pdf	4/24/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_WALKDOWN	.pdf	4/21/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_IR VERIFICATION	.pdf	4/21/2018	IR Verification Field Data Sheet
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_0893_Normal	.mp4	4/21/2018	IR Camera Video Normal Operations
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_0894_Dump	.mp4	4/21/2018	IR Camera Video During Dump Event
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_0895_Post	.mp4	4/21/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L01 & ST T4N-R64W-S36 L03_SIGNED EVAL	.pdf	5/4/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ST T4N-R64W-S36 L01**

**Consent Decree Tank System Number:** **500/804**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>25,734</b>	<b>25,739</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,247</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>81,289</b>	<b>81,289</b>	
Total VCS Capacity (scfh)	<b>86,536</b>	<b>92,956</b>	
VCS Capacity minus PPIVF (scfh)	<b>60,802</b>	<b>67,217</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 10/1/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/2/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST T4N-R64W-S36 L01**

Consent Decree Tank System Number: **500/804**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2409	2409						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7						
Working Flow (Mscfd) <sup>h,i</sup>	23	23						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	29	0

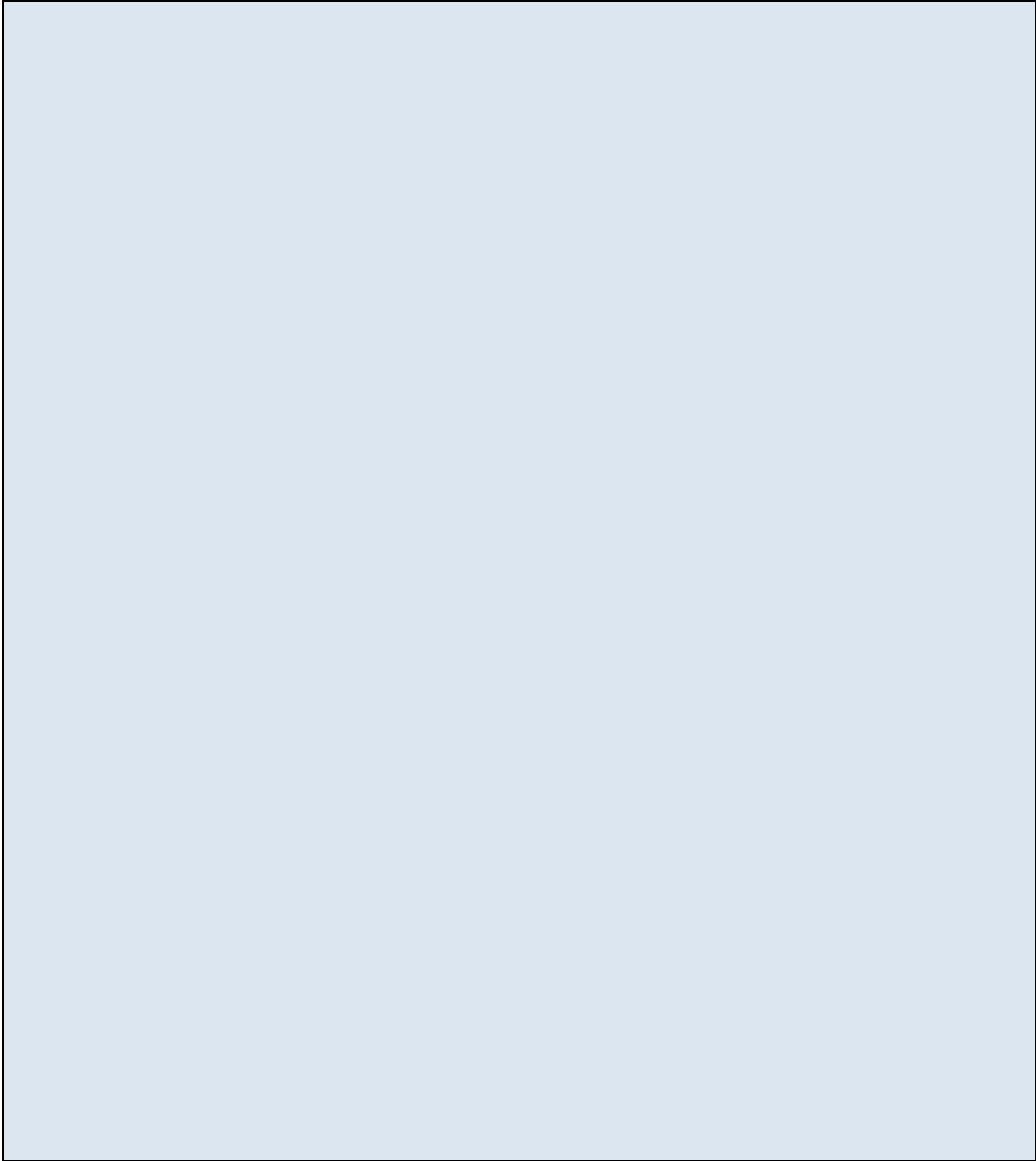
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	22,641	22,641
Oil Tank Working Rate	1,909	1,904
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
Total	25,739	25,734

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST T4N-R64W-S36 L01**

Consent Decree Tank System Number: **500/804**

**Audit Notes**

A large, empty rectangular box with a light blue background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST T4N-R64W-S36 L02**

Consent Decree Tank System Number: **972**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L02_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
ST T4N-R64W-S36 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L02_FINAL PACKET	.pdf	7/11/2018	Work Request
ST T4N-R64W-S36 L02_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L02_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L02_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
ST T4N-R64W-S36 L02_2307_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
ST T4N-R64W-S36 L02_2308_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
ST T4N-R64W-S36 L02_2309_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ST T4N-R64W-S36 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST T4N-R64W-S36 L02**

Consent Decree Tank System Number: **972**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>374</b>	<b>374</b>	
Total VCS Capacity (scfh)	<b>4,142</b>	<b>4,974</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,074</b>	<b>1,905</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/1/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST T4N-R64W-S36 L02**

Consent Decree Tank System Number: **972**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

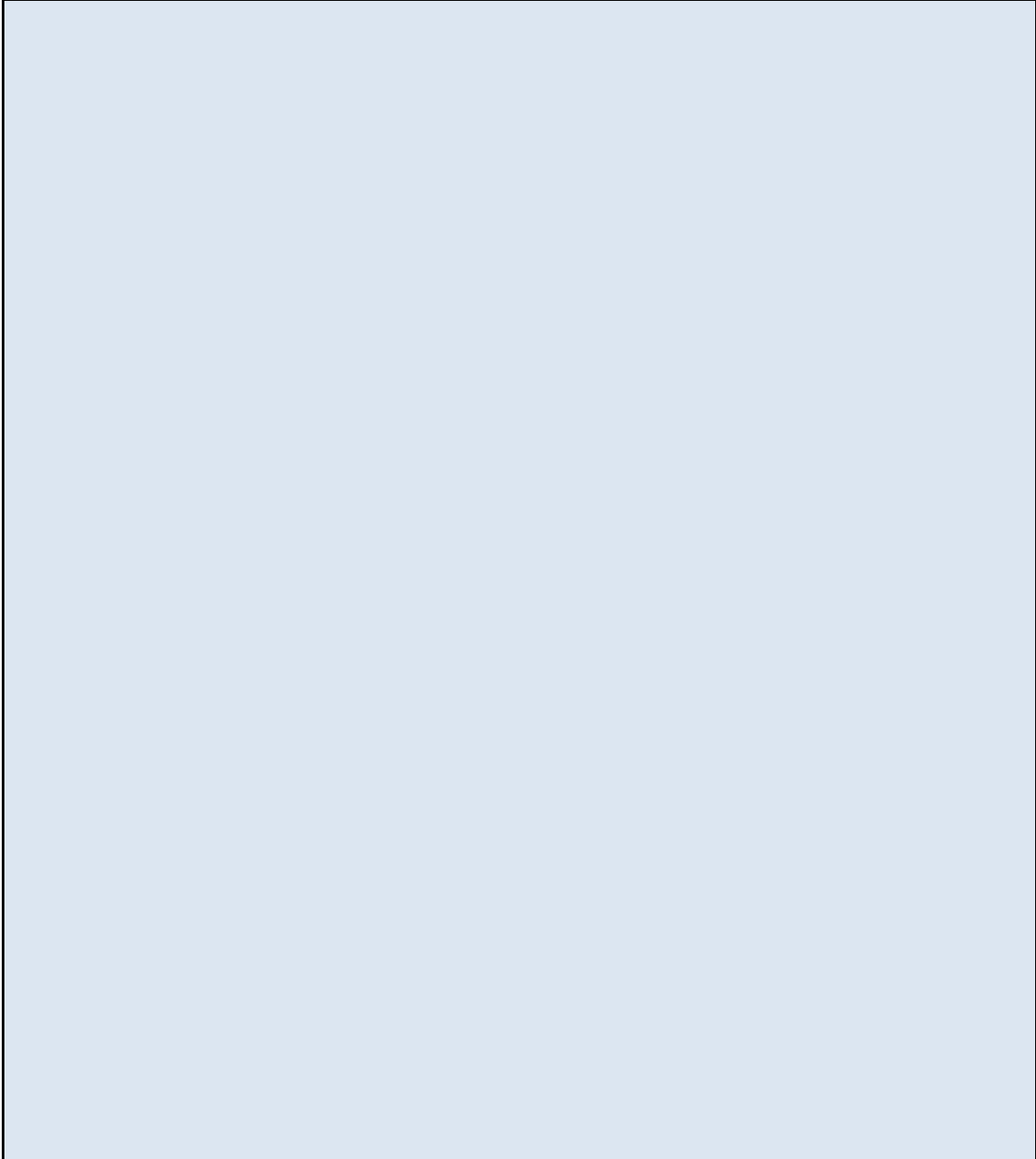
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ST T4N-R64W-S36 L02**

Consent Decree Tank System Number: **972**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:**        **STEPHENSON KREPS T6N-R64W-S6 L01**

**Consent Decree Tank System Number:**        **608**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
STEPHENSON KREPS T6N-R64W-S6 L01_FINAL PACKET	.pdf	8/27/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
STEPHENSON KREPS T6N-R64W-S6 L01_STEM Engineering Evaluation_rev1	.xlsm	1/24/2018	STEM Engineering Evaluation Spreadsheet
STEPHENSON KREPS T6N-R64W-S6 L01_SIGNED EVAL	.pdf	1/25/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
STEPHENSON KREPS T6N-R64W-S6 L01_FINAL PACKET	.pdf	8/3/2017	Work Request
STEPHENSON KREPS T6N-R64W-S6 L01_FINAL PACKET	.pdf	8/9/2017	Construction Jobsheets
SLR_Noble_CD Data Request 5_Noble Response_20181114	.xlsx	11/14/2018	Data Request Response

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
STEPHENSON KREPS T6N-R64W-S6 L01_WALKDOWN	.pdf	11/30/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
STEPHENSON KREPS T6N-R64W-S6 L01_IR VERIFICATION	.pdf	11/30/2017	IR Verification Field Data Sheet
STEPHENSON KREPS T6N-R64W-S6 L01_0049_NORMAL	.mp4	11/30/2017	IR Camera Video Normal Operations
STEPHENSON KREPS T6N-R64W-S6 L01_0050_DUMP	.mp4	11/30/2017	IR Camera Video During Dump Event
STEPHENSON KREPS T6N-R64W-S6 L01_0051_POST	.mp4	11/30/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
STEPHENSON KREPS T6N-R64W-S6 L01_SIGNED EVAL	.pdf	1/25/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **STEPHENSON KREPS T6N-R64W-S6 L01**

**Consent Decree Tank System Number:** **608**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>1 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,244</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,483</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>12,735</b>	<b>12,735</b>	
Total VCS Capacity (scfh)	<b>16,218</b>	<b>17,693</b>	
VCS Capacity minus PPIVF (scfh)	<b>12,136</b>	<b>13,450</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff  
 Audit Document Review Date: 11/14/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STEPHENSON KREPS T6N-R64W-S6 L01**

Consent Decree Tank System Number: **608**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>794</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>82.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,454</b>	<b>3,307</b>
Oil Tank Working Rate	<b>314</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,244</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STEPHENSON KREPS T6N-R64W-S6 L01**

Consent Decree Tank System Number: **608**

**Audit Notes**

1. The Work Request indicated the oil dump valves on Separators 2 were to be modified to Kimray 1400 with 1/2 inch trims. The trim size was confirmed by item A1 of the Walkdown Checklist. Could not verify the oil dump valve size (1") on separator with the documentation provided. Conservatively assumed the valve to be 2", the largest available size for 1/2" trim. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.
2. The Signed Evaluation indicates one tank was to be left empty and used for headspace. The data request received on 11/14/2018 states that this was verified in the field on or around 8/15/2017.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STEVE T5N-R66W-S18 L01**

Consent Decree Tank System Number: **33**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
STEVE T5N-R66W-S18 L01_FINAL PACKET	.pdf	12/10/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
STEVE T5N-R66W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	5/13/2016	STEM Engineering Evaluation Spreadsheet
STEVE T5N-R66W-S18 L01_SIGNED EVAL	.pdf	5/24/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
STEVE T5N-R66W-S18 L01_FINAL PACKET	.pdf	2/29/2016	Work Request
STEVE T5N-R66W-S18 L01_FINAL PACKET	.pdf	3/30/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
STEVE T5N-R66W-S18 L01_WALKDOWN	.pdf	4/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
STEVE T5N-R66W-S18 L01_IR VERIFICATION	.pdf	4/26/2016	IR Verification Field Data Sheet
STEVE T5N-R66W-S18 L01_0896_NORMAL	.mp4	4/21/2016	IR Camera Video Normal Operations
STEVE T5N-R66W-S18 L01_0897_DUMP	.mp4	4/21/2016	IR Camera Video During Dump Event
STEVE T5N-R66W-S18 L01_0898_POST	.mp4	4/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
STEVE T5N-R66W-S18 L01_SIGNED EVAL	.pdf	5/24/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **STEVE T5N-R66W-S18 L01**

**Consent Decree Tank System Number:** **33**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,986</b>	<b>11,164</b>	<b>-14%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>71,661</b>	<b>71,661</b>	
Total VCS Capacity (scfh)	<b>75,424</b>	<b>76,214</b>	
VCS Capacity minus PPIVF (scfh)	<b>62,438</b>	<b>65,050</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 12/15/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 1/7/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STEVE T5N-R66W-S18 L01**

Consent Decree Tank System Number: **33**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.70</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>19.90</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2051</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>231.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>20</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>9,638</b>	<b>11,321</b>
Oil Tank Working Rate	<b>813</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>11,164</b>	<b>12,986</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STEVE T5N-R66W-S18 L01**

Consent Decree Tank System Number: **33**

**Audit Notes**

The work request specifies installation of valves with 2" trims. The signed evaluation was completed with a 2" valve with a 1" trim. The Construction Jobsheet (Page 33 of the Final Packet) indicates a 1" 1400 valve with 1" trim was installed. A 1" 1400 valve with a 1" trim has a smaller valve coefficient (19.9 gpm/psi) and thus a lower oil flow rate than a 2" valve with a 1" trim (21.25 gpm/psi). The modeling guideline for this site was considered to be applied correctly for this tank system.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STINAR T4N-R64W-S14 L01**

Consent Decree Tank System Number: **471**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
STINAR T4N-R64W-S14 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
STINAR T4N-R64W-S14 L01_STEM Engineering Evaluation_rev1	.xls	7/11/2018	STEM Engineering Evaluation Spreadsheet
STINAR T4N-R64W-S14 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
STINAR T4N-R64W-S14 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
STINAR T4N-R64W-S14 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
STINAR T4N-R64W-S14 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
STINAR T4N-R64W-S14 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
STINAR T4N-R64W-S14 L01_1887_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
STINAR T4N-R64W-S14 L01_1888_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
STINAR T4N-R64W-S14 L01_1889_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
STINAR T4N-R64W-S14 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STINAR T4N-R64W-S14 L01**

Consent Decree Tank System Number: **471**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,582</b>	<b>13,584</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,812</b>	<b>10,792</b>	
Headspace Surge Capacity (scfh)	<b>28,545</b>	<b>28,545</b>	
Total VCS Capacity (scfh)	<b>33,357</b>	<b>39,337</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,775</b>	<b>25,753</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STINAR T4N-R64W-S14 L01**

Consent Decree Tank System Number: **471**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50							
Z2	-0.86							
Z3	0.98							
Z	1.61							
Gas/Oil Ratio (scf/bbl)	256.2							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	601							
Vapor Pressure (psia) <sup>c</sup>	153							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.82							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1184							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	303.3							
Working Flow (Mscfd) <sup>h,i</sup>	11							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	12,639	12,639
Oil Tank Working Rate	469	468
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	13,584	13,582

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STINAR T4N-R64W-S14 L01**

Consent Decree Tank System Number: **471**

### Audit Notes

The stem work request form (PG 3 of Final Packet pdf) states for the pneumatic pshh to set the hp hi/lo no higher than 140 psig however nowhere in the job sheets (PGs 21-25) does it confirm this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 4), 'STEM Design Confirmation Form' (Final Packet - page 9), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 140 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01**

**Consent Decree Tank System Number:** **2343/1954**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WAKE T6N-R65W-S24 L01_FINAL PACKET	.pdf	7/13/2018	Wake Facility Pre-Evaluation Facility Inspection
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01_FINAL PACKET	.pdf	7/13/2018	Storis and Mackinaw Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WAKE T6N-R65W-S24 L01_FINAL PACKET	.pdf	7/13/2018	Work Request

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01_IR VERIFICATION	.pdf	7/13/2018	IR Verification Field Data Sheet
WAKE T6N-R65W-S24 L01_2083_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WAKE T6N-R65W-S24 L01_2084_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WAKE T6N-R65W-S24 L01_2085_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01_0415_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01_0418_DUMP	.mp4	7/11/2018	IR Camera Video Post Dump Event
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01_0417_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01**

Consent Decree Tank System Number: **2343/1954**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>22</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>6</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>4 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>8 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1-4	Vessel 5-8	Vessel 9-12	Vessel 13-15				
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>				

<b>Water</b>	HP Vessel 1-4	HP Vessel 5-8	HP Vessel 9-12	HP Vessel 13-15	LP Vessel 1-4	LP Vessel 5-8	LP Vessel 9-12	LP Vessel 13-15
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>4</b>	<b>2</b>		
Man. Capacity (MSCFD)	<b>109,272</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>81,826</b>	<b>290,297</b>	<b>255%</b>
Calculated Burner Capacity (scfh)	<b>14,465</b>	<b>29,879</b>	
Headspace Surge Capacity (scfh)	<b>339,337</b>	<b>1,068,662</b>	
Total VCS Capacity (scfh)	<b>353,802</b>	<b>1,098,541</b>	
VCS Capacity minus PPIVF (scfh)	<b>271,976</b>	<b>808,244</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Rachel Acker

Audit Document Review Date: \_\_\_\_\_ 10/2/2018

Audit Document Review Verified by: \_\_\_\_\_ James Van Horne

Audit Document Verification Date: \_\_\_\_\_ 12/31/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01**

Consent Decree Tank System Number: **2343/1954**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02	-1.02				
Z2	-0.86	-0.86	-0.86	-0.86				
Z3	0.98	0.98	0.98	0.98				
Z	-0.90	-0.90	-0.90	-0.90				
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9	22.9				

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	0.77	0.77	0.77	0.77				
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25				
Critical Pressure (psia) <sup>b</sup>	833	833	833	833				
Vapor Pressure (psia) <sup>c</sup>	407	407	407	407				
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	0.76	0.76	0.76	0.76				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bopd) <sup>f,g</sup>	27622	27622	27622	20716				

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	632.6	632.6	632.6	474.5				
Working Flow (Mscfd) <sup>h,i</sup>	263	263	263	197				

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25	21.25	21.25
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200	3200	3200
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1	1	1
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak Flow (bwopd) <sup>f,g</sup>	45526	45526	45526	34144	45526	45526	45526	34144

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	182	182	182	137	182	182	182	137
Working Flow (Mscfd) <sup>l</sup>	256	256	256	192	256	256	256	192

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>l</sup>	396	396
Mscfd	209	57

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	98,846	26,359
Oil Tank Working Rate	41,044	10,918
Water Tank Flash Rate	56,907	15,175
Water Tank Working Rate	79,878	21,300
Tank Breathing Rate	11,095	5,547
Truck Loading Vapor	2,527	2,527
Total	290,297	81,826

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01**

Consent Decree Tank System Number: **2343/1954**

**Audit Notes**

The walkdown checklist (STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01\_FINAL PACKET).

The field data sheet (STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01\_FINAL PACKET, p 8-11) lists "no tab" for the oil valve and trim size for LP separators #2 and 3. The Data Request Response from 12/10/2018 confirmed these separators both have 2" valves with 1" trims.

There is not a valve size listed for water valve sizes for HP and LP separators #2, 3, and 4. The largest valve size (2") for a 1" trim was used to be conservative. Seat sizes for oil valves on LP separators #5, 7, 10, 11, 12, and 13 are unknown. Seat sizes for water valves on HP separators #5, 6, 7, 12, 13, 14, and 15 are unknown. The largest seat size (1") for a Kimray 2200 SMA valve was used in these calculations to be conservative.

The data request response from 12/10/2018 confirmed that the Wake E-24-77HN was moved into the HP separator with the Storis E24-75-1HN, as requested in the work request (WAKE T6N-R65W-S24 L01\_FINAL PACKET, p 3)

According to the Field datasheet (STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01\_FINAL PACKET, p 3 & 12) , the NPS from header to burners lists a 4" line to KO #2, a 6" line to KO #1, and a 3" line to the VRU. The model (STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01\_STEM Engineering Evaluation\_rev1) was run with one 8" line. This is conservative because an 8" line has a smaller effective diameter and thus more pressure drop than a 4" and 6" line combined.

The field data sheet (STORIS E24 & MACKINAW A19 ECONODE T6N-R65W-S24 L01& WAKE T6N-R65W-S24 L01\_FINAL PACKET, p 8-11 ) indicates there are 15 high/low separator trains on site. The model was run using oil dumps from 4 separators and water dumps from 8 separators. Based on the Tank System Document Review, the Modeling Guidance has not been correctly applied.

The tank system contains 2 banks each with 11 oil and 2 water tanks. Breathing emissions from the non-producing tank bank was not accounted for in the Signed Evaluation.

This site was selected for an additional IR Camera inspection because parts of the original footage is too dark to visually inspect for leaks.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH JOHNSON T3N-R65W-S12 L01**

Consent Decree Tank System Number: **391**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
STROH JOHNSON T3N-R65W-S12 L01_FINAL PACKET	.pdf	10/5/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
STROH JOHNSON T3N-R65W-S12 L01_STEM Engineering Evaluation_rev1	.xls	10/5/2017	STEM Engineering Evaluation Spreadsheet
STROH JOHNSON T3N-R65W-S12 L01_SIGNED EVAL	.pdf	1/3/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
STROH JOHNSON T3N-R65W-S12 L01_FINAL PACKET	.pdf	10/5/2016	Work Request
STROH JOHNSON T3N-R65W-S12 L01_FINAL PACKET	.pdf	10/5/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
STROH JOHNSON T3N-R65W-S12 L01_WALKDOWN	.pdf	10/5/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
STROH JOHNSON T3N-R65W-S12 L01_IR VERIFICATION	.pdf	10/4/2016	IR Verification Field Data Sheet
STROH JOHNSON T3N-R65W-S12 L01_1545_NORMAL	.mp4	9/27/2016	IR Camera Video Normal Operations
STROH JOHNSON T3N-R65W-S12 L01_1546_DUMP	.mp4	9/27/2016	IR Camera Video During Dump Event
STROH JOHNSON T3N-R65W-S12 L01_1547_POST	.mp4	9/27/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
STROH JOHNSON T3N-R65W-S12 L01_SIGNED EVAL	.pdf	10/11/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH JOHNSON T3N-R65W-S12 L01**

Consent Decree Tank System Number: **391**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,788</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>2,628</b>	<b>2,628</b>	
Total VCS Capacity (scfh)	<b>6,416</b>	<b>7,181</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,334</b>	<b>3,098</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/17/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/27/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH JOHNSON T3N-R65W-S12 L01**

Consent Decree Tank System Number: **391**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

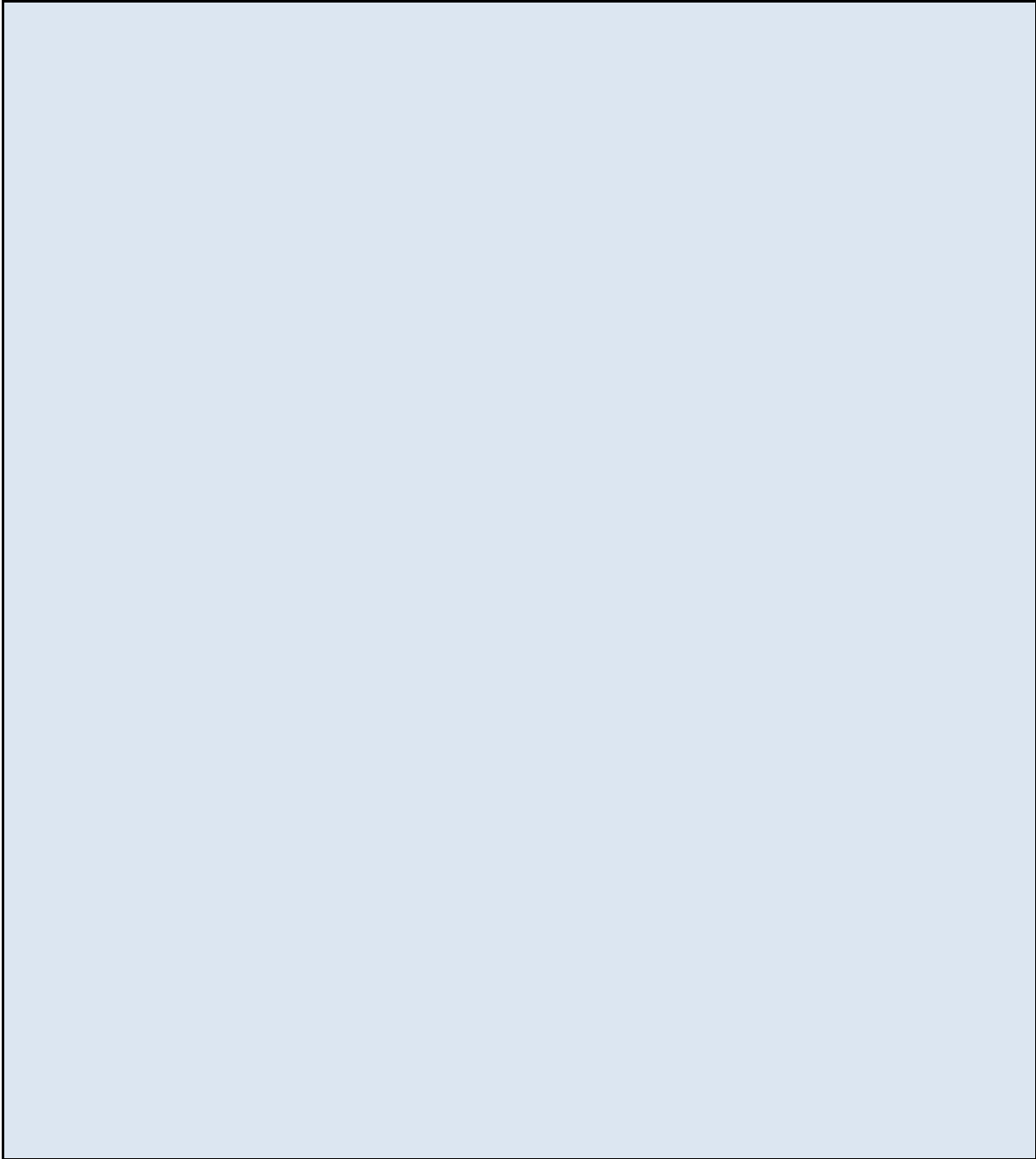
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH JOHNSON T3N-R65W-S12 L01**

Consent Decree Tank System Number: **391**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH T3N-R65W-S12 L04**

Consent Decree Tank System Number: **701**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
STROH T3N-R65W-S12 L04_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
STROH T3N-R65W-S12 L04_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
STROH T3N-R65W-S12 L04_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
STROH T3N-R65W-S12 L04_FINAL PACKET	.pdf	7/11/2018	Work Request
STROH T3N-R65W-S12 L04_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
STROH T3N-R65W-S12 L04_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
STROH T3N-R65W-S12 L04_IR VERIFICATION UPDATE	.pdf	7/11/2018	IR Verification Field Data Sheet
STROH T3N-R65W-S12 L04_0003_NORMAL UPDATE	.mp4	7/11/2018	IR Camera Video Normal Operations
STROH T3N-R65W-S12 L04_0004_DUMP UPDATE	.mp4	7/11/2018	IR Camera Video During Dump Event
STROH T3N-R65W-S12 L04_0005_POST UPDATE	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
STROH T3N-R65W-S12 L04_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **STROH T3N-R65W-S12 L04**

**Consent Decree Tank System Number:** **701**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,378</b>	<b>12,200</b>	<b>-1%</b>
Calculated Burner Capacity (scfh)	<b>2,902</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>41,729</b>	<b>41,729</b>	
Total VCS Capacity (scfh)	<b>44,631</b>	<b>47,562</b>	
VCS Capacity minus PPIVF (scfh)	<b>32,253</b>	<b>35,362</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 12/13/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH T3N-R65W-S12 L04**

Consent Decree Tank System Number: **701**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	34	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,605	7,771
Oil Tank Working Rate	641	654
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	2,527	2,527
Total	12,200	12,378

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH T3N-R65W-S12 L04**

Consent Decree Tank System Number: **701**

**Audit Notes**

Surge Vessels: No confirmation on Job Sheet that tanks 3 & 5 disconnected for head space as requested on pp 3-4. Response to Data Request states: "Field verification for this facility was completed on or around 4/21/2016, field verification confirmed that two tanks were converted to headspace tanks." Results in adequate VCS with a 60% Max capacity.

Dump valve size: The Work Request form specifies that all the 212 dump valves on the HLP be replaced with a 1" 1400 with 1/2" trim. For the LP separator the Work Request form asks for confirmation that the oil dump valves are 1/2" trim. The Signed Evaluation considers two 2" & 1/2" oil dump valves. Based on the supplied field data, one of the dump valves should have been a 1" & 1/2" valve. For the analysis, a 2" dump valve with 1/2" trim would be conservative, so no further information is needed to verify the valve and trim size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH T5N-R64W-S35 L01**

Consent Decree Tank System Number: **805**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
STROH T5N-R64W-S35 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
STROH T5N-R64W-S35 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
STROH T5N-R64W-S35 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
STROH T5N-R64W-S35 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
STROH T5N-R64W-S35 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
STROH T5N-R64W-S35 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
STROH T5N-R64W-S35 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
STROH T5N-R64W-S35 L01_0076_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
STROH T5N-R64W-S35 L01_0077_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
STROH T5N-R64W-S35 L01_0078_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
STROH T5N-R64W-S35 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **STROH T5N-R64W-S35 L01**

**Consent Decree Tank System Number:** **805**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>211</b>	<b>211</b>	
Total VCS Capacity (scfh)	<b>4,238</b>	<b>5,169</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,170</b>	<b>2,100</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH T5N-R64W-S35 L01**

Consent Decree Tank System Number: **805**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

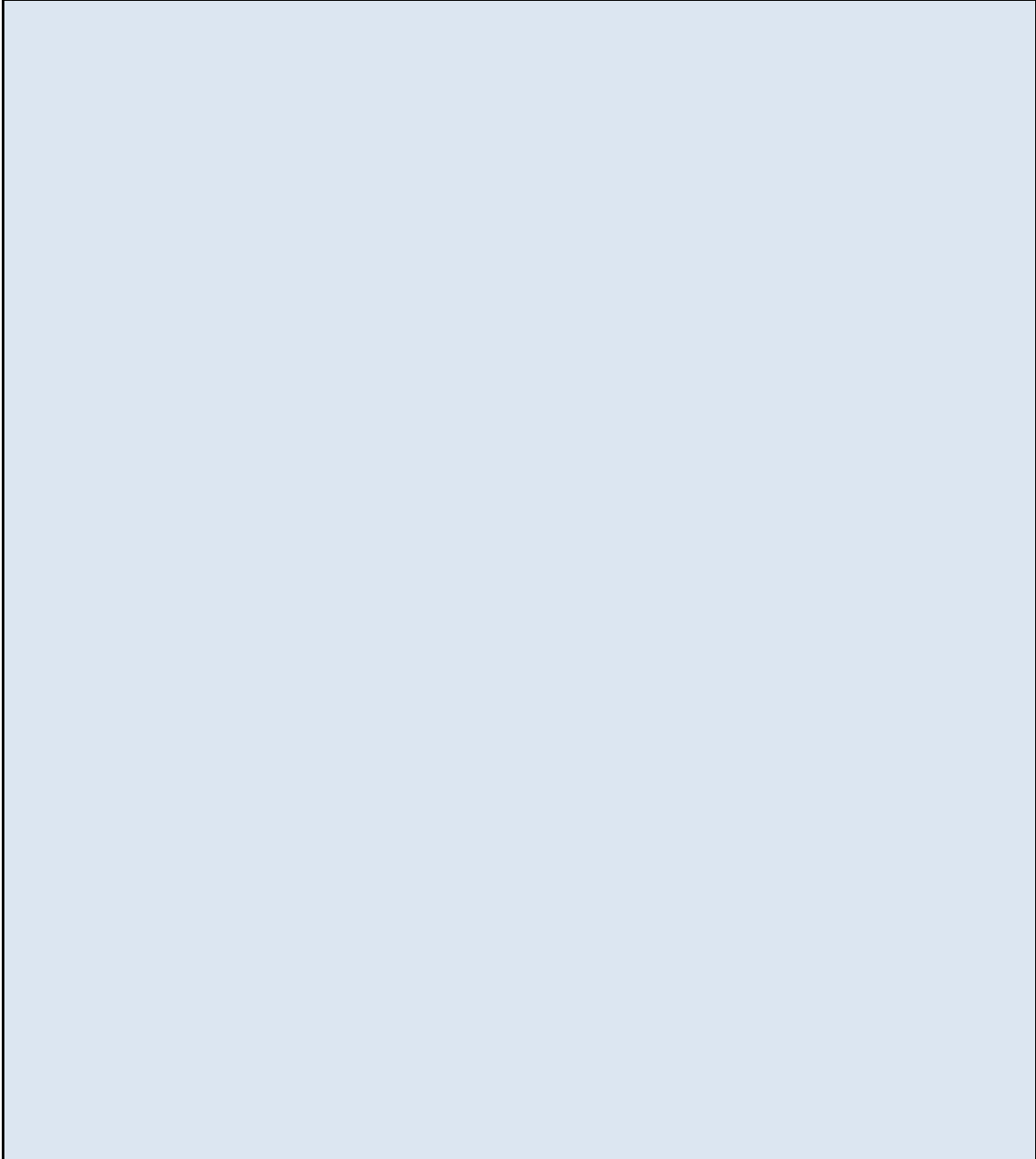
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **STROH T5N-R64W-S35 L01**

Consent Decree Tank System Number: **805**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SUSAN WESTERN T5N-R67W-S35 L01**

Consent Decree Tank System Number: **2228**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SUSAN WESTERN T5N-R67W-S35 L01_FINAL PACKET	.pdf	5/2/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SUSAN WESTERN T5N-R67W-S35 L01_STEM Engineering Evaluation_rev1	.xlsm	5/15/2017	STEM Engineering Evaluation Spreadsheet
SUSAN WESTERN T5N-R67W-S35 L01_Final Signed STEM Plan	.pdf	7/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SUSAN WESTERN T5N-R67W-S35 L01_FINAL PACKET	.pdf	5/2/2017	Work Request
SUSAN WESTERN T5N-R67W-S35 L01_FINAL PACKET	.pdf	5/2/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SUSAN WESTERN T5N-R67W-S35 L01_WALKDOWN	.pdf	5/2/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SUSAN WESTERN T5N-R67W-S35 L01_IR VERIFICATION	.pdf	5/1/2017	IR Verification Field Data Sheet
SUSAN WESTERN T5N-R67W-S35 L01_2002_NORMAL	.mp4	5/1/2017	IR Camera Video Normal Operations
SUSAN WESTERN T5N-R67W-S35 L01_2003_DUMP	.mp4	5/1/2017	IR Camera Video During Dump Event
SUSAN WESTERN T5N-R67W-S35 L01_2004_POST	.mp4	5/1/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SUSAN WESTERN T5N-R67W-S35 L01_SIGNED EVAL	.pdf	5/19/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **SUSAN WESTERN T5N-R67W-S35 L01**

**Consent Decree Tank System Number:** **2228**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,571</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>2,939</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>132</b>	<b>132</b>	
Total VCS Capacity (scfh)	<b>3,071</b>	<b>5,965</b>	
VCS Capacity minus PPIVF (scfh)	<b>635</b>	<b>3,394</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 12/27/2017  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 3/30/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SUSAN WESTERN T5N-R67W-S35 L01**

Consent Decree Tank System Number: **2228**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>458</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>51.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>2,152</b>	<b>2,027</b>
Oil Tank Working Rate	<b>181</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,571</b>	<b>2,436</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SUSAN WESTERN T5N-R67W-S35 L01**

Consent Decree Tank System Number: **2228**

**Audit Notes**

-The walkdown checklist was not marked complete.

-The construction job sheet (SUSAN WESTERN T5N-R67W-S35 L01\_FINAL PACKET page 21) states that the PSHH was set to 60 psig. The QC Stem Checkout (SUSAN WESTERN T5N-R67W-S35 L01\_FINAL PACKET page 26) states that the PSHH was set to 70 psig. The QC Stem Checkout was completed on 4/11/2016 after the construction ended 4/5/2016. The PSHH set point from the QC Stem Checkout was used in these calculations because it was confirmed after the construction ended and results in a higher PPIVFR than the confirmed set point in the construction job sheet. The signed eval was completed at 70 psig.

-The size oil dump valve on the new HLP separator could not be confirmed. The signed evaluation was completed with a 1" valve. The largest valve size, 2" with the confirmed 3/8" trim size was used for these calculations. It is unknown if the modeling guideline was strictly followed with an unconfirmed valve size.

This site was selected for IR Camera Inspection based upon not knowing if modeling guidance was strictly followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SWANSON OIL T6N-R66W-S28 L01**

Consent Decree Tank System Number: **7**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
SWANSON OIL T6N-R66W-S28 L01_FINAL PACKET	.pdf	2/3/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
SWANSON OIL T6N-R66W-S28 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
SWANSON OIL T6N-R66W-S28 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
SWANSON OIL T6N-R66W-S28 L01_FINAL PACKET	.pdf	2/3/2016	Work Request
SWANSON OIL T6N-R66W-S28 L01_FINAL PACKET	.pdf	2/3/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
SWANSON OIL T6N-R66W-S28 L01_WALKDOWN	.pdf	2/3/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
SWANSON OIL T6N-R66W-S28 L01_IR VERIFICATION	.pdf	2/3/2016	IR Verification Field Data Sheet
SWANSON OIL T6N-R66W-S28 L01_0647_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
SWANSON OIL T6N-R66W-S28 L01_0648_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
SWANSON OIL T6N-R66W-S28 L01_0649_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
SWANSON OIL T6N-R66W-S28 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SWANSON OIL T6N-R66W-S28 L01**

Consent Decree Tank System Number: **7**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>527</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,295</b>	<b>10,433</b>	
VCS Capacity minus PPIVF (scfh)	<b>851</b>	<b>6,989</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 10/9/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SWANSON OIL T6N-R66W-S28 L01**

Consent Decree Tank System Number: **7**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **SWANSON OIL T6N-R66W-S28 L01**

Consent Decree Tank System Number: **7**

**Audit Notes**

The walkdown checklist (SWANSON OIL T6N-R66W-S28 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (SWANSON OIL T6N-R66W-S28 L01\_FINAL PACKET).

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TANIA BLUE GUTTERSEN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **522**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_1405_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_1406_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_1407_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TANIA BLUE GUTTERSEN T3N-R64W-S2 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **TANIA BLUE GUTTERSEN T3N-R64W-S2 L01**

**Consent Decree Tank System Number:** **522**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,984</b>	<b>4,985</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,740</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>24,491</b>	<b>24,491</b>	
Total VCS Capacity (scfh)	<b>28,231</b>	<b>29,044</b>	
VCS Capacity minus PPIVF (scfh)	<b>23,247</b>	<b>24,059</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Craig Bock & James Van Horne  
 Audit Document Verification Date: 9/14/2018 & 8/25/2020



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TANIA BLUE GUTTERSEN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **522**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,985</b>	<b>4,984</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TANIA BLUE GUTTERSEN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **522**

**Audit Notes**

Headspace Tanks: The Work Request form specifies one of the 300 bbl oil tanks to be used as a headspace tank. There is no information in the field documents that confirms one of the 300 bbl oil tanks was disconnected from the fill header and left connected to the VOC header to be used as a headspace tank. Noble confirmed verbally on 8/25/2020 that one tank was converted to a headspace tank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **TANIA GUTTERSEN T3N-R64W-S2 L01**

**Consent Decree Tank System Number:** **504**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TANIA GUTTERSEN T3N-R64W-S2 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TANIA GUTTERSEN T3N-R64W-S2 L01_STEM Engineering Evaluation_rev1	.xls	7/11/2018	STEM Engineering Evaluation Spreadsheet
TANIA GUTTERSEN T3N-R64W-S2 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TANIA GUTTERSEN T3N-R64W-S2 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
TANIA GUTTERSEN T3N-R64W-S2 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TANIA GUTTERSEN T3N-R64W-S2 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TANIA GUTTERSEN T3N-R64W-S2 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
TANIA GUTTERSEN T3N-R64W-S2 L01_1230_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
TANIA GUTTERSEN T3N-R64W-S2 L01_1233_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
TANIA GUTTERSEN T3N-R64W-S2 L01_1234_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TANIA GUTTERSEN T3N-R64W-S2 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TANIA GUTTERSEN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **504**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,255</b>	<b>9,256</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,893</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>19,622</b>	<b>19,622</b>	
Total VCS Capacity (scfh)	<b>22,515</b>	<b>25,455</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,260</b>	<b>16,199</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell

Audit Document Review Date: 7/30/2018

Audit Document Review Verified by: Chris Boggess

Audit Document Verification Date: 11/16/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TANIA GUTTERSEN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **504**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	29	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
<b>Total</b>	<b>9,256</b>	<b>9,255</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TANIA GUTTERSEN T3N-R64W-S2 L01**

Consent Decree Tank System Number: **504**

**Audit Notes**

The stem work request (PG 3 of Final Packet pdf) states to disconnect tank 5 from the fill header but leave connected to the VOC header to be used for headspace however nowhere in the job sheets (PGs 21-25 of Final Packet pdf) does it state this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 6/6/2016, field verification confirmed that one tank was converted to a headspace tank."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** THISTLE DOWN ST T5N-R65W-S25 L01

**Consent Decree Tank System Number:** 2027

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S25 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
THISTLE DOWN ST T5N-R65W-S25 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S25 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
THISTLE DOWN ST T5N-R65W-S25 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S25 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S25 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
THISTLE DOWN ST T5N-R65W-S25 L01_0922_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
THISTLE DOWN ST T5N-R65W-S25 L01_0923_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
THISTLE DOWN ST T5N-R65W-S25 L01_0924_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S25 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **THISTLE DOWN ST T5N-R65W-S25 L01**

**Consent Decree Tank System Number:** **2027**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>19,813</b>	<b>19,816</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>78,607</b>	<b>78,607</b>	
Total VCS Capacity (scfh)	<b>82,370</b>	<b>83,160</b>	
VCS Capacity minus PPIVF (scfh)	<b>62,557</b>	<b>63,344</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THISTLE DOWN ST T5N-R65W-S25 L01**

Consent Decree Tank System Number: **2027**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77							
Z2	-0.86							
Z3	0.98							
Z	0.89							
Gas/Oil Ratio (scf/bbl)	112.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77							
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25							
Critical Pressure (psia) <sup>b</sup>	539							
Vapor Pressure (psia) <sup>c</sup>	83							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	2409							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7							
Working Flow (Mscfd) <sup>h,i</sup>	23							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>j</sup>	3200	3200						
Vapor Pressure (psia) <sup>k</sup>	1	1						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bwpd) <sup>f,g</sup>	11381	5068						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	46	20						
Working Flow (Mscfd) <sup>l</sup>	64	28						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	17	6

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,321	11,321
Oil Tank Working Rate	955	952
Water Tank Flash Rate	2,741	2,741
Water Tank Working Rate	3,848	3,848
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>19,816</b>	<b>19,813</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THISTLE DOWN ST T5N-R65W-S25 L01**

Consent Decree Tank System Number: **2027**

### Audit Notes

The signed evaluation states that there is no tank banking, however the final packet states that the tanks are banked (FINAL PACKET p. 30).

Noble provided a response to the above discrepancy on 11/14/2018 that states "An engineering review of this facility was completed on or around 9/17/2018, this review confirmed that the tanks are not banked."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THISTLE DOWN ST T5N-R65W-S36 L01**

Consent Decree Tank System Number: **273**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_FINAL PACKET	.pdf	1/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	1/8/2018	STEM Engineering Evaluation Spreadsheet
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_FINAL PACKET	.pdf	1/16/2016	Work Request
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_FINAL PACKET	.pdf	1/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_WALKDOWN	.pdf	1/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_IR VERIFICATION	.pdf	1/14/2016	IR Verification Field Data Sheet
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_0006_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_0007_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_0008_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01_FINAL PACKET	.pdf	1/16/2016	Final Signed Engineering Evaluation
R65W-S36 L01_COMPLETED TLO	.pdf	7/11/2018	Completed TLO documentation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THISTLE DOWN ST T5N-R65W-S36 L01**

Consent Decree Tank System Number: **273**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>8</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>3</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>3</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>3</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>270</b>	
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>	

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>3</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>25,801</b>	<b>25,806</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>11,213</b>	<b>13,659</b>	
Headspace Surge Capacity (scfh)	<b>40,224</b>	<b>40,224</b>	
Total VCS Capacity (scfh)	<b>51,437</b>	<b>53,883</b>	
VCS Capacity minus PPIVF (scfh)	<b>25,636</b>	<b>28,077</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/7/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 10/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THISTLE DOWN ST T5N-R65W-S36 L01**

Consent Decree Tank System Number: **273**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77	0.77					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	0.89	0.89	0.89					
Gas/Oil Ratio (scf/bbl)	112.8	112.8	112.8					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	0.78	0.78	0.78					
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20					
Critical Pressure (psia) <sup>b</sup>	539	539	539					
Vapor Pressure (psia) <sup>c</sup>	83	83	83					
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	0.85	0.85	0.85					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	827	827	827					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3	93.3					
Working Flow (Mscfd) <sup>h,i</sup>	8	8	8					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	0.78	0.78	0.78	0.78	0.78	0.78	0.94	
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20	7.20	7.20	7.20	7.20	5.72	
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200	3200	
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1	1	
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Peak Flow (bwpd) <sup>f,g</sup>	1739	1739	1739	3906	3906	3906	3093	

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	7	7	7	16	16	16	12	
Working Flow (Mscfd) <sup>l</sup>	10	10	10	22	22	22	17	

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	46	17

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	11,656	11,656
Oil Tank Working Rate	983	980
Water Tank Flash Rate	3,338	3,338
Water Tank Working Rate	4,686	4,685
Tank Breathing Rate	2,615	2,615
Truck Loading Vapor	2,527	2,527
Total	25,806	25,801

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THISTLE DOWN ST T5N-R65W-S36 L01**

Consent Decree Tank System Number: **273**

**Audit Notes**

The walkdown checklist (THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01\_WALKDOWN) was not marked as being complete. Completion of the STEM work request was verified through other documentation in the final packet (THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01\_FINAL PACKET).

The signed eval (THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01\_SIGNED EVAL) states there are 3 water tanks connected to the VCS system. The field datasheet (THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01\_FINAL PACKET, p 6) does not indicate the three (3) 300 bbl water tanks are connected to the VCS system. The field datasheet drawing (THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01\_FINAL PACKET, p 4) shows the water tanks are connected to the main VCS line. The water tanks were left in the model to be conservative.

The field datasheet (THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01\_FINAL PACKET, p 7) state that the oil outlet for the separator for State Farm 36-6, 11 is routed to tank 9 which vents to atmosphere and is not part of the VCS. The work request asks to double check if the State Farm 36-06,11 is comingled with the Thistle Down State PC F36-67HN and that the Comingled was "done by STEM pre-May 1st." There is not data provided confirming this double check was completed. The signed eval (THISTLE DOWN ST T5N-R65W-S36 L01 & ST FARM T5N-R65W-S36 L01\_SIGNED EVAL) has the State Farm 36-6,11 oil comingled in an LP separator with the Thistle Down State PC F36-67HN and the water going directly to tanks from the HP separator. The modeling guideline was still strictly applied because either the separator is comingled as indicated or it dumps to a tank that is not part of the VCS.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOLEN ST T7N-R64W-S36 L01**

Consent Decree Tank System Number: **1664**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
THOLEN ST T7N-R64W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
THOLEN ST T7N-R64W-S36 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
THOLEN ST T7N-R64W-S36 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
THOLEN ST T7N-R64W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
THOLEN ST T7N-R64W-S36 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
THOLEN ST T7N-R64W-S36 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
THOLEN ST T7N-R64W-S36 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
THOLEN ST T7N-R64W-S36 L01_1884_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
THOLEN ST T7N-R64W-S36 L01_1885_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
THOLEN ST T7N-R64W-S36 L01_1886_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
THOLEN ST T7N-R64W-S36 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** THOLEN ST T7N-R64W-S36 L01

**Consent Decree Tank System Number:** 1664

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	2
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,508	4,509	0%
Calculated Burner Capacity (scfh)	3,998	4,958	
Headspace Surge Capacity (scfh)	13,019	13,019	
Total VCS Capacity (scfh)	17,017	17,977	
VCS Capacity minus PPIVF (scfh)	12,509	13,468	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOLEN ST T7N-R64W-S36 L01**

Consent Decree Tank System Number: **1664**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOLEN ST T7N-R64W-S36 L01**

Consent Decree Tank System Number: **1664**

**Audit Notes**

Emissions were observed on the tank closest to the equipment on site during the dump video (SN 17860). Emissions appear to be coming from a PRV on top of tank, therefore this site has been selected for IR camera inspection.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOMPSON T4N-R64W-S28 L03**

Consent Decree Tank System Number: **508**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
THOMPSON T4N-R64W-S28 L03_FINAL PACKET	.pdf	10/13/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
THOMPSON T4N-R64W-S28 L03_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/14/2017	STEM Engineering Evaluation Spreadsheet
THOMPSON T4N-R64W-S28 L03_SIGNED EVAL	.pdf	7/17/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
THOMPSON T4N-R64W-S28 L03_FINAL PACKET	.pdf	10/13/2017	Work Request
THOMPSON T4N-R64W-S28 L03_FINAL PACKET	.pdf	10/13/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
THOMPSON T4N-R64W-S28 L03_WALKDOWN	.pdf	4/28/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
THOMPSON T4N-R64W-S28 L03_IR VERIFICATION	.pdf	4/28/2017	IR Verification Field Data Sheet
THOMPSON T4N-R64W-S28 L03_1990_NORMAL	.mp4	4/28/2017	IR Camera Video Normal Operations
THOMPSON T4N-R64W-S28 L03_1991_DUMP	.mp4	4/28/2017	IR Camera Video During Dump Event
THOMPSON T4N-R64W-S28 L03_1992_POST	.mp4	4/28/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
THOMPSON T4N-R64W-S28 L03_SIGNED EVAL	.pdf	7/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOMPSON T4N-R64W-S28 L03**

Consent Decree Tank System Number: **508**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>8</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>	<b>2" &amp; 3/4"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>26,391</b>	<b>26,395</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,220</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>100,356</b>	<b>100,356</b>	
Total VCS Capacity (scfh)	<b>105,576</b>	<b>112,023</b>	
VCS Capacity minus PPIVF (scfh)	<b>79,185</b>	<b>85,628</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: \_\_\_\_\_ Tom Kussard  
 Audit Document Review Date: \_\_\_\_\_ 11/17/2017  
 Audit Document Review Verified by: \_\_\_\_\_ Nick Michaelson  
 Audit Document Verification Date: \_\_\_\_\_ 12/14/2017



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOMPSON T4N-R64W-S28 L03**

Consent Decree Tank System Number: **508**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77	0.77					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	0.89	0.89	0.89					
Gas/Oil Ratio (scf/bbl)	112.8	112.8	112.8					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.80	0.80	0.80					
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	12.20	12.20	12.20					
Critical Pressure (psia) <sup>b</sup>	539	539	539					
Vapor Pressure (psia) <sup>c</sup>	83	83	83					
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85	0.85	0.85					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	1437	1437	1437					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	162.1	162.1	162.1					
Working Flow (Mscfd) <sup>h,i</sup>	14	14	14					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	46	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	20,258	20,258
Oil Tank Working Rate	1,708	1,704
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,902	1,902
Truck Loading Vapor	2,527	2,527
Total	26,395	26,391

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOMPSON T4N-R64W-S28 L03**

Consent Decree Tank System Number: **508**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet pg 11-16) are not dated. Assumed the date is the same as Facility Scouting date (3/22/16).

**2. Number of vapor surge vessels onsite**

The STEM Work Request (Final Packet pg 3), requests three oil tanks be bottomed out and used as surge vessels onsite. The Job Sheet (Final Packet pg 21) indicates that oil lines on the tanks were modified. Check C8 & C13 of the Walkdown Checklist (Final Packet pg 29) are checked "N/A" and the Field Datasheet (Final packet pg 14) indicate each HP/LP separator combination produce to separate oil tanks. Given the above information it is determined that three vapor surge vessels are currently onsite.

**Update 6/13/2018 - Noble confirms via data request the three tanks were converted into headspace tanks.**

**3. Tank combustor information not consistent**

The Field Data Sheet (Final Packet pg 15) shows two tank combustors previously existing onsite. The Installed Equipment Sheet (Final Packet pg 22) indicates two new LEED 48" burners were installed onsite. However, the serial numbers included on the installed equipment sheet match those of the existing combustors on the field data sheet. Therefore the existing combustors are still being used onsite and new combustors were never installed

**4. Separator information not consistent**

In the provided documentation there are discrepancies in how the configuration of the existing separators was modified. The STEM Work Request Form (Final Packet pg 3) lists three separators for removal (#1, #4, and #5 on the field data sheet, Final Packet pg 14). The Job Sheet (Final Packet pg 23) indicates separators #1, #3, and #8 were removed. The automation email (Final Packet pg 26) is in agreement with the STEM Work Request Form, indicating that the job sheet is erroneous. The STEM Walkdown Checklist (Final Packet pg 29), specifically checks C1, C3-C8 and C13, provide enough information to confirm the proper separator configuration is currently onsite.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOMSON SLW RANCH T5N-R64W-S12 L01**

Consent Decree Tank System Number: **290**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
THOMSON SLW RANCH T5N-R64W-S12 L01_FINAL PACKET	.pdf	2/9/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
THOMSON SLW RANCH T5N-R64W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
THOMSON SLW RANCH T5N-R64W-S12 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
THOMSON SLW RANCH T5N-R64W-S12 L01_FINAL PACKET	.pdf	2/9/2016	Work Request
THOMSON SLW RANCH T5N-R64W-S12 L01_FINAL PACKET	.pdf	2/9/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
THOMSON SLW RANCH T5N-R64W-S12 L01_WALKDOWN	.pdf	2/4/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
THOMSON SLW RANCH T5N-R64W-S12 L01_IR VERIFICATION	.pdf	2/4/2016	IR Verification Field Data Sheet
THOMSON SLW RANCH T5N-R64W-S12 L01_0662_NORMAL	.mp4	2/4/2016	IR Camera Video Normal Operations
THOMSON SLW RANCH T5N-R64W-S12 L01_0663_DUMP	.mp4	2/4/2016	IR Camera Video During Dump Event
THOMSON SLW RANCH T5N-R64W-S12 L01_0664_POST	.mp4	2/4/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
THOMSON SLW RANCH T5N-R64W-S12 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **THOMSON SLW RANCH T5N-R64W-S12 L01**

**Consent Decree Tank System Number:** **290**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,787</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>1,471</b>	<b>1,471</b>	
Total VCS Capacity (scfh)	<b>5,258</b>	<b>6,024</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,577</b>	<b>2,199</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/23/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOMSON SLW RANCH T5N-R64W-S12 L01**

Consent Decree Tank System Number: **290**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THOMSON SLW RANCH T5N-R64W-S12 L01**

Consent Decree Tank System Number: **290**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Field Datasheet (Final Packet, pg 13) shows the HLP separator onsite originally had a 2" oil dump valve with unknown trim size. The STEM Work Request Form (Final Packet, pg 3) requests the existing 2" oil dump valve be replaced with a 1" valve with 1/2" trim. The Engineering Evaluation shows a 1" oil dump valve onsite with 1/2" trim. ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 6) is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation, and is therefore 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the separator onsite. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **THUNDERHEAD USX T7N-R64W-S25 L01**

**Consent Decree Tank System Number:** **1600**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
THUNDERHEAD USX T7N-R64W-S25 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
THUNDERHEAD USX T7N-R64W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
THUNDERHEAD USX T7N-R64W-S25 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
THUNDERHEAD USX T7N-R64W-S25 L01_FINAL PACKET // THUNDERHEAD USX T7N-R64W-S25 L01_COMPLETED TLO	.pdf	7/11/2018	Work Request
THUNDERHEAD USX T7N-R64W-S25 L01_FINAL PACKET // THUNDERHEAD USX T7N-R64W-S25 L01_COMPLETED TLO	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
THUNDERHEAD USX T7N-R64W-S25 L01_FINAL PACKET // THUNDERHEAD USX T7N-R64W-S25 L01_COMPLETED TLO	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
THUNDERHEAD USX T7N-R64W-S25 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
THUNDERHEAD USX T7N-R64W-S25 L01_0209_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
THUNDERHEAD USX T7N-R64W-S25 L01_0210_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
THUNDERHEAD USX T7N-R64W-S25 L01_0211_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
THUNDERHEAD USX T7N-R64W-S25 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **THUNDERHEAD USX T7N-R64W-S25 L01**

**Consent Decree Tank System Number:** **1600**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,989</b>	<b>15,991</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,507</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>78,309</b>	<b>78,309</b>	
Total VCS Capacity (scfh)	<b>80,816</b>	<b>84,142</b>	
VCS Capacity minus PPIVF (scfh)	<b>64,827</b>	<b>68,152</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/24/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THUNDERHEAD USX T7N-R64W-S25 L01**

Consent Decree Tank System Number: **1600**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

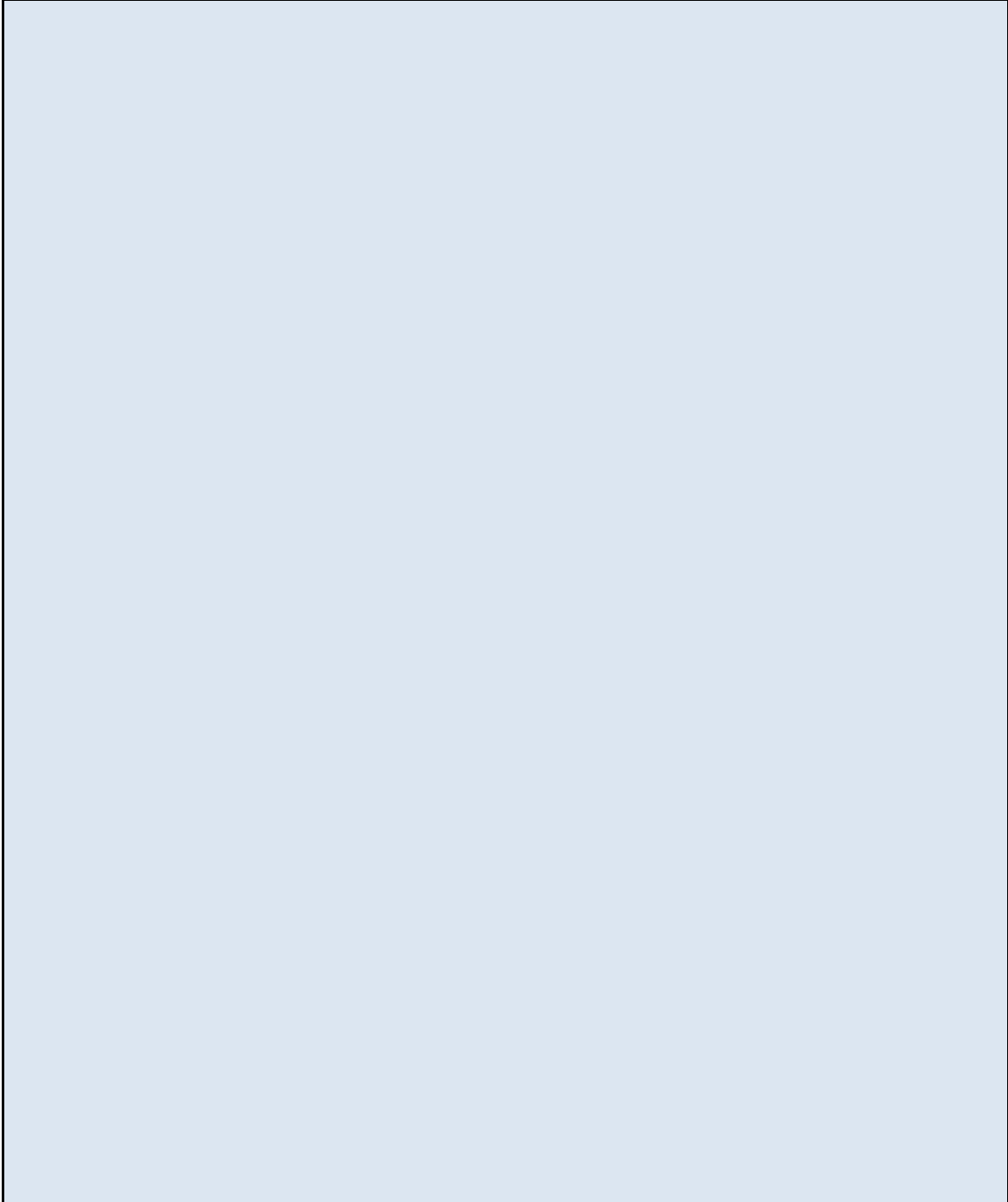
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>15,991</b>	<b>15,989</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **THUNDERHEAD USX T7N-R64W-S25 L01**

Consent Decree Tank System Number: **1600**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TIGGES T6N-R66W-S19 L01**

Consent Decree Tank System Number: **1780**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
TIGGES T6N-R66W-S19 L01_FINAL PACKET	.pdf	10/5/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
TIGGES T6N-R66W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	10/5/2017	STEM Engineering Evaluation Spreadsheet
TIGGES T6N-R66W-S19 L01_SIGNED EVAL	.pdf	10/9/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
TIGGES T6N-R66W-S19 L01_FINAL PACKET	.pdf	10/5/2017	Work Request
TIGGES T6N-R66W-S19 L01_FINAL PACKET	.pdf	10/5/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
TIGGES T6N-R66W-S19 L01_FINAL PACKET	.pdf	10/5/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
TIGGES T6N-R66W-S19 L01_IR VERIFICATION	.pdf	10/31/2016	IR Verification Field Data Sheet
TIGGES T6N-R66W-S19 L01_1671_NORMAL	.mp4	10/31/2016	IR Camera Video Normal Operations
TIGGES T6N-R66W-S19 L01_1672_DUMP	.mp4	10/31/2016	IR Camera Video During Dump Event
TIGGES T6N-R66W-S19 L01_1673_POST	.mp4	10/31/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
TIGGES T6N-R66W-S19 L01_SIGNED EVAL	.pdf	10/9/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TIGGES T6N-R66W-S19 L01**

Consent Decree Tank System Number: **1780**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>255</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>4,437</b>	<b>4,617</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>16,104</b>	<b>16,104</b>	
Total VCS Capacity (scfh)	<b>20,193</b>	<b>20,704</b>	
VCS Capacity minus PPIVF (scfh)	<b>15,756</b>	<b>16,087</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TIGGES T6N-R66W-S19 L01**

Consent Decree Tank System Number: **1780**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>255</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>202</b>	<b>0</b>
Mscfd	<b>10</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>404</b>	<b>404</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,617</b>	<b>4,437</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TIGGES T6N-R66W-S19 L01**

Consent Decree Tank System Number: **1780**

**Audit Notes**

**Possible IR Signature Observed**

Possible IR signature observed at ~1 min 50 secs into both the 1672 DUMP and 1673 POST IR videos. It appears the IR signature originates from the combustors behind the tanks and not the tank itself.

**Oil Tank Sizes**

Field datasheets (Final Packet, pg 11) indicate (1) 210 bbl oil tank and (1) 300 bbl oil tank onsite. Noble averaged these two tank sizes together and used (2) 255 bbl oil tanks onsite in the Engineering Evaluation. These tanks have not been removed and exist onsite currently.

**Separator Max Operating Pressure**

ITEM B3 of the STEM Checklist is checked "yes", indicating that the low pressure separator is set to shut in at 70 psig according to the Signed Eval.

**Oil Dump Valve Size - Unknown**

The Engineering Evaluation shows a 1" oil dump valve onsite with 1/2" trim. The Job Sheet (Final Packet, pg 21) indicates the HLP separator onsite is new and no documentation is provided indicating the oil dump valve and/or trim size. ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 7) is checked "yes", indicating the oil dump trim size onsite is 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the separator onsite. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being followed. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TODD LONG T4N-R64W-S20 L01**

Consent Decree Tank System Number: **673**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
TODD LONG T4N-R64W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
TODD LONG T4N-R64W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
TODD LONG T4N-R64W-S20 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
TODD LONG T4N-R64W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
TODD LONG T4N-R64W-S20 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
TODD LONG T4N-R64W-S20 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
TODD LONG T4N-R64W-S20 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
TODD LONG T4N-R64W-S20 L01_2024_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
TODD LONG T4N-R64W-S20 L01_2025_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
TODD LONG T4N-R64W-S20 L01_2026_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
TODD LONG T4N-R64W-S20 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TODD LONG T4N-R64W-S20 L01**

Consent Decree Tank System Number: **673**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,459</b>	<b>5,460</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,911</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>27,526</b>	<b>27,526</b>	
Total VCS Capacity (scfh)	<b>30,437</b>	<b>33,359</b>	
VCS Capacity minus PPIVF (scfh)	<b>24,978</b>	<b>27,899</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/8/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TODD LONG T4N-R64W-S20 L01**

Consent Decree Tank System Number: **673**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>34</b>	<b>0</b>

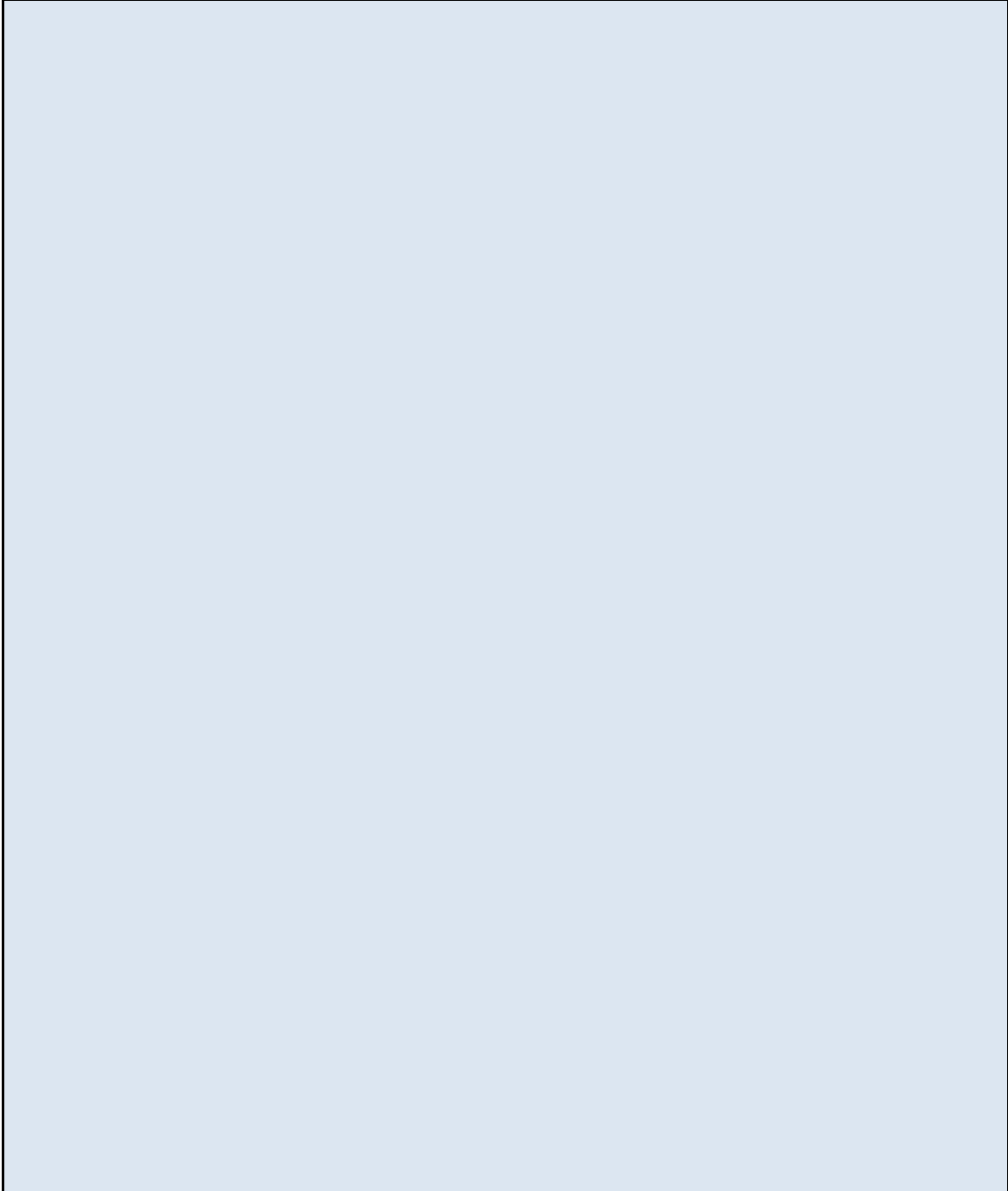
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,460</b>	<b>5,459</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TODD LONG T4N-R64W-S20 L01**

Consent Decree Tank System Number: **673**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L03**

Consent Decree Tank System Number: **1241**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L03_FINAL PACKET	.pdf	6/28/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L03_STEM Engineering Evaluation_rev1	.xls	7/5/2016	STEM Engineering Evaluation Spreadsheet
TREBOR T5N-R64W-S11 L03_Final Signed STEM Plan	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L03_FINAL PACKET	.pdf	6/28/2016	Work Request
TREBOR T5N-R64W-S11 L03_FINAL PACKET	.pdf	6/28/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L03_WALKDOWN	.pdf	6/28/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L03_IR VERIFICATION	.pdf	6/23/2016	IR Verification Field Data Sheet
TREBOR T5N-R64W-S11 L033_1173_NORMAL	.mp4	6/22/2016	IR Camera Video Normal Operations
TREBOR T5N-R64W-S11 L03_1174_DUMP	.mp4	6/22/2016	IR Camera Video During Dump Event
TREBOR T5N-R64W-S11 L03_1175_POST	.mp4	6/22/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L03_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L03**

Consent Decree Tank System Number: **1241**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>534</b>	<b>534</b>	
Total VCS Capacity (scfh)	<b>4,302</b>	<b>5,134</b>	
VCS Capacity minus PPIVF (scfh)	<b>858</b>	<b>1,689</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 5/7/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 6/5/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L03**

Consent Decree Tank System Number: **1241**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	6	

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	3,445	3,444

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L03**

Consent Decree Tank System Number: **1241**

**Audit Notes**

The walkdown checklist is not marked complete

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L05**

Consent Decree Tank System Number: **1245**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L05_FINAL PACKET	.pdf	1/14/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L05_STEM Engineering Evaluation_rev1	.xls	6/23/2017	STEM Engineering Evaluation Spreadsheet
TREBOR T5N-R64W-S11 L05_Final Signed STEM Plan	.pdf	12/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L05_FINAL PACKET	.pdf	1/14/2016	Work Request
TREBOR T5N-R64W-S11 L05_FINAL PACKET	.pdf	1/14/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L05_WALKDOWN	.pdf	1/14/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L05_IR VERIFICATION	.pdf	1/14/2016	IR Verification Field Data Sheet
TREBOR T5N-R64W-S11 L05_0017_NORMAL	.mp4	1/13/2016	IR Camera Video Normal Operations
TREBOR T5N-R64W-S11 L05_0018_DUMP	.mp4	1/13/2016	IR Camera Video During Dump Event
TREBOR T5N-R64W-S11 L05_0019_POST	.mp4	1/13/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L05_SIGNED EVAL	.pdf	7/21/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L05**

Consent Decree Tank System Number: **1245**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,096</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>1,072</b>	<b>1,072</b>	
Total VCS Capacity (scfh)	<b>6,168</b>	<b>10,272</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,660</b>	<b>5,763</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 5/7/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 6/5/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L05**

Consent Decree Tank System Number: **1245**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L05**

Consent Decree Tank System Number: **1245**

**Audit Notes**

The walkdown checklist is not marked complete

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L09**

Consent Decree Tank System Number: **294**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L09_FINAL PACKET	.pdf	2/1/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L09_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
TREBOR T5N-R64W-S11 L09_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L09_FINAL PACKET	.pdf	2/1/2016	Work Request
TREBOR T5N-R64W-S11 L09_FINAL PACKET	.pdf	2/1/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L09_WALKDOWN	.pdf	2/1/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L09_IR VERIFICATION	.pdf	2/1/2016	IR Verification Field Data Sheet
TREBOR T5N-R64W-S11 L09_0632_NORMAL	.mp4	1/27/2016	IR Camera Video Normal Operations
TREBOR T5N-R64W-S11 L09_0633_DUMP	.mp4	1/27/2016	IR Camera Video During Dump Event
TREBOR T5N-R64W-S11 L09_0634_POST	.mp4	1/27/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S11 L09_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **TREBOR T5N-R64W-S11 L09**

**Consent Decree Tank System Number:** **294**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,222</b>	<b>5,222</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,012</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>7,124</b>	<b>7,124</b>	
Total VCS Capacity (scfh)	<b>13,136</b>	<b>17,557</b>	
VCS Capacity minus PPIVF (scfh)	<b>7,914</b>	<b>12,335</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 6/11/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/9/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L09**

Consent Decree Tank System Number: **294**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>29</b>	<b>0</b>

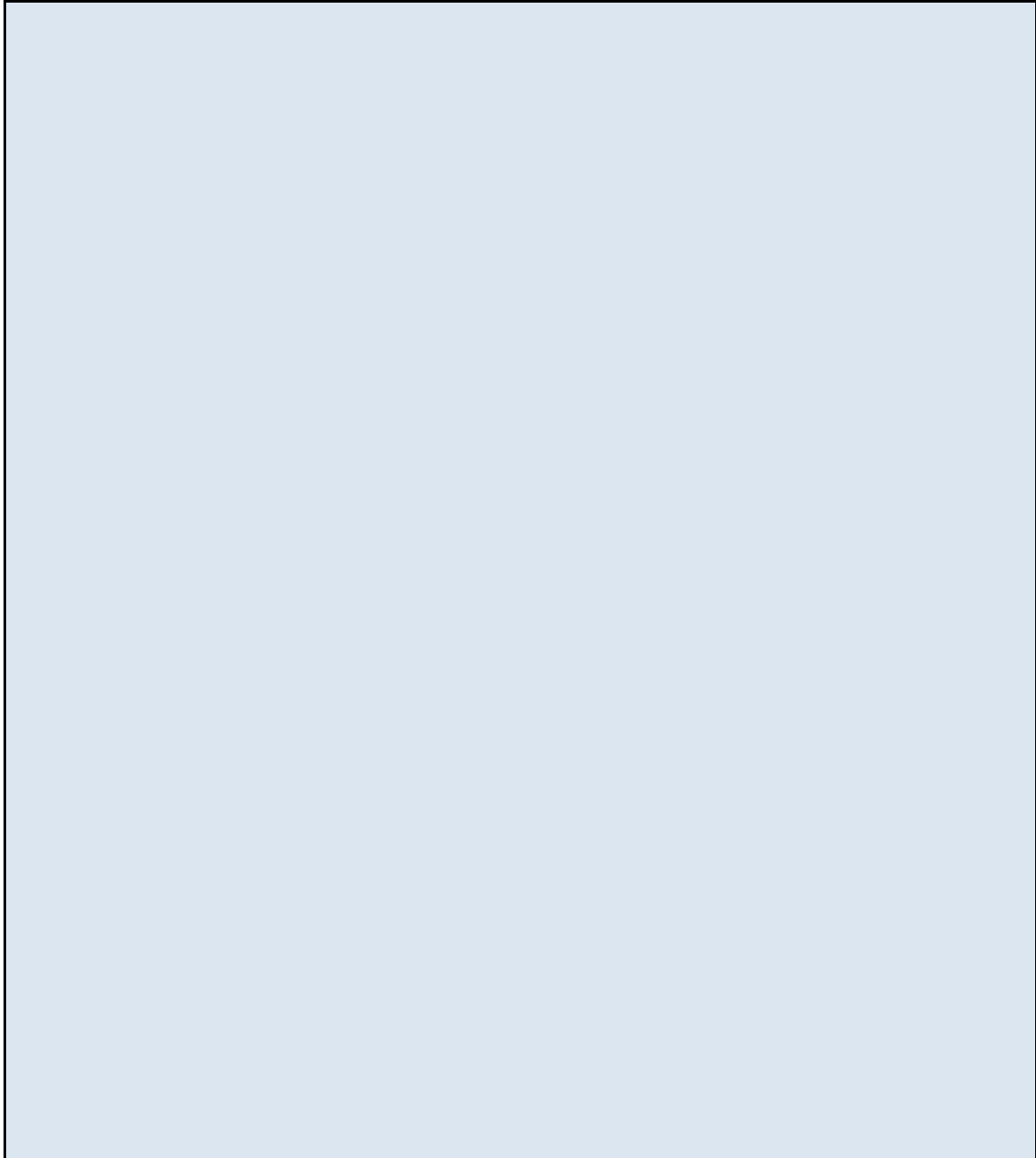
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,222</b>	<b>5,222</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S11 L09**

Consent Decree Tank System Number: **294**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S12 L03**

Consent Decree Tank System Number: **1249**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L03_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L03_STEM Engineering Evaluation_rev1	.xls	7/11/2018	STEM Engineering Evaluation Spreadsheet
TREBOR T5N-R64W-S12 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L03_FINAL PACKET	.pdf	7/11/2018	Work Request
TREBOR T5N-R64W-S12 L03_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L03_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L03_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
TREBOR T5N-R64W-S12 L03_1420_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
TREBOR T5N-R64W-S12 L03_1421_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
TREBOR T5N-R64W-S12 L03_1422_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S12 L03**

Consent Decree Tank System Number: **1249**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>300</b>	<b>300</b>	
Total VCS Capacity (scfh)	<b>4,520</b>	<b>4,900</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,076</b>	<b>1,313</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury

Audit Document Review Date: 7/23/2018

Audit Document Review Verified by: Chris Boggess

Audit Document Verification Date: 11/16/2018

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S12 L03**

Consent Decree Tank System Number: **1249**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S12 L03**

Consent Decree Tank System Number: **1249**

**Audit Notes**

The work request (FINAL PACKET p. 4) states that the VOC line from the tank to the KO needs to be changed from 2" to 3". There is no verification that this work was completed (FINAL PACKET p. 8-31). Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 8/3/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S12 L04**

Consent Decree Tank System Number: **1246**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L04_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L04_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
TREBOR T5N-R64W-S12 L04_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L04_FINAL PACKET	.pdf	7/11/2018	Work Request
TREBOR T5N-R64W-S12 L04_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L04_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L04_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
TREBOR T5N-R64W-S12 L04_0282_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
TREBOR T5N-R64W-S12 L04_0283_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
TREBOR T5N-R64W-S12 L04_0284_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S12 L04_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **TREBOR T5N-R64W-S12 L04**

**Consent Decree Tank System Number:** **1246**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>527</b>	<b>527</b>	
Total VCS Capacity (scfh)	<b>4,295</b>	<b>5,127</b>	
VCS Capacity minus PPIVF (scfh)	<b>851</b>	<b>1,682</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/26/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S12 L04**

Consent Decree Tank System Number: **1246**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

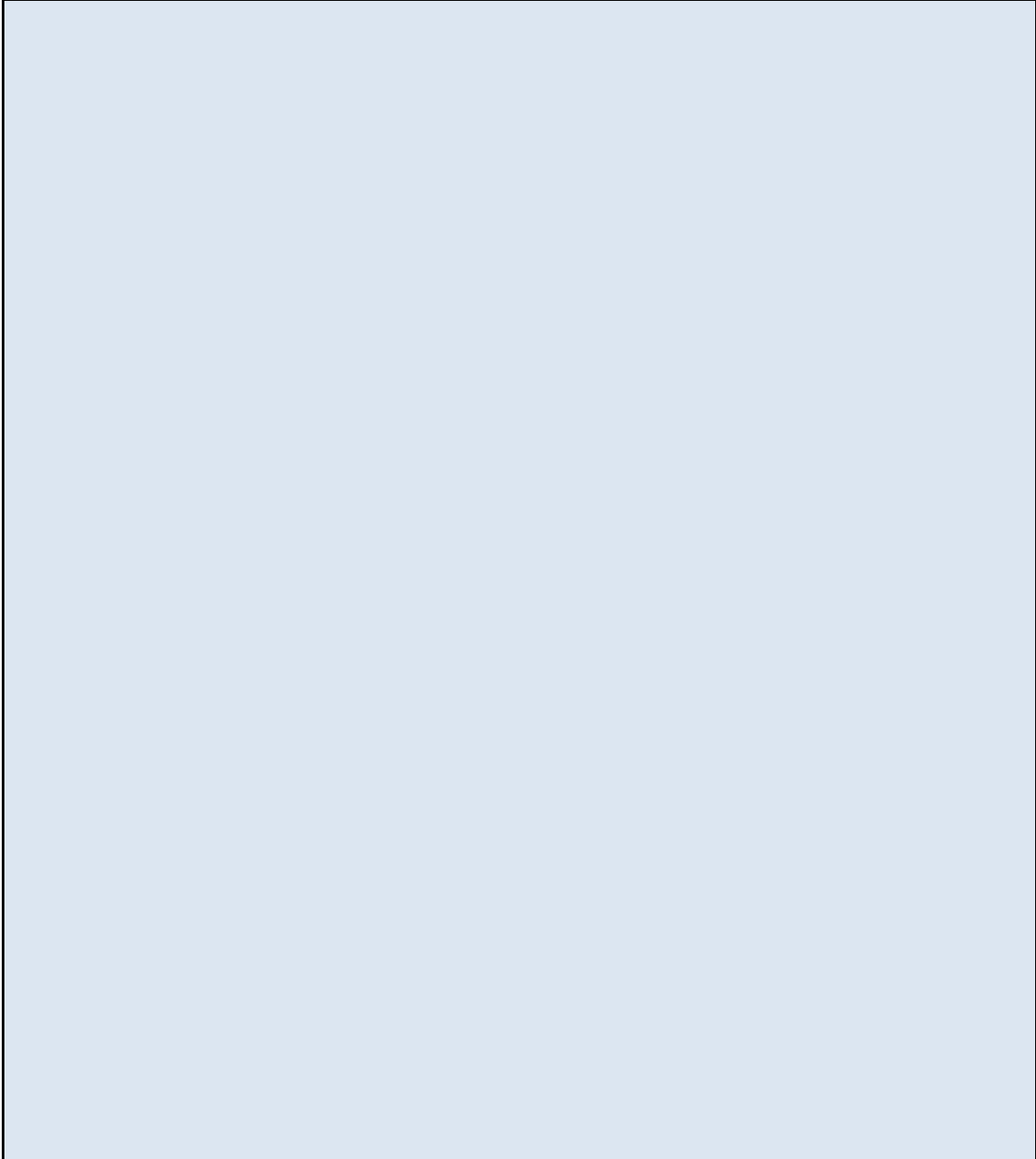
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S12 L04**

Consent Decree Tank System Number: **1246**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S14 L01**

Consent Decree Tank System Number: **1250**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S14 L01_FINAL PACKET	.pdf	2/1/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S14 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
TREBOR T5N-R64W-S14 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S14 L01_FINAL PACKET	.pdf	2/1/2016	Work Request
TREBOR T5N-R64W-S14 L01_FINAL PACKET	.pdf	2/1/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S14 L01_WALKDOWN	.pdf	2/1/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S14 L01_IR VERIFICATION	.pdf	2/1/2016	IR Verification Field Data Sheet
TREBOR T5N-R64W-S14 L01_0638_NORMAL	.mp4	1/27/2018	IR Camera Video Normal Operations
TREBOR T5N-R64W-S14 L01_0639_DUMP	.mp4	1/27/2018	IR Camera Video During Dump Event
TREBOR T5N-R64W-S14 L01_0640_POST	.mp4	1/27/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TREBOR T5N-R64W-S14 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** TREBOR T5N-R64W-S14 L01

**Consent Decree Tank System Number:** 1250

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>790</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,456</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>611</b>	<b>1,113</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 6/11/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/9/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S14 L01**

Consent Decree Tank System Number: **1250**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,845</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR T5N-R64W-S14 L01**

Consent Decree Tank System Number: **1250**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR WACKER PETERSON T5N-R64W-S10 L01**

Consent Decree Tank System Number: **295**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TREBOR WACKER PETERSON T5N-R64W-S10 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TREBOR WACKER PETERSON T5N-R64W-S10 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
TREBOR WACKER PETERSON T5N-R64W-S10 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR WACKER PETERSON T5N-R64W-S10 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
TREBOR WACKER PETERSON T5N-R64W-S10 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TREBOR WACKER PETERSON T5N-R64W-S10 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TREBOR WACKER PETERSON T5N-R64W-S10 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
TREBOR WACKER PETERSON T5N-R64W-S10 L01_0635_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
TREBOR WACKER PETERSON T5N-R64W-S10 L01_0636_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
TREBOR WACKER PETERSON T5N-R64W-S10 L01_0637_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TREBOR WACKER PETERSON T5N-R64W-S10 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **TREBOR WACKER PETERSON T5N-R64W-S10 L01**

**Consent Decree Tank System Number:** **295**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,384</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>3,553</b>	<b>3,553</b>	
Total VCS Capacity (scfh)	<b>8,937</b>	<b>15,220</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,191</b>	<b>10,473</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/1/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR WACKER PETERSON T5N-R64W-S10 L01**

Consent Decree Tank System Number: **295**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TREBOR WACKER PETERSON T5N-R64W-S10 L01**

Consent Decree Tank System Number: **295**

**Audit Notes**

Emissions were observed on tank 1 (SN 14014) during the dump video. Emissions appear to be coming from the their hatch on top of tank, therefore this site has been selected for IR camera inspection.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TULO SCHMIDT T4N-R65W-S19 L01\_1157**

Consent Decree Tank System Number: **135**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TULO SCHMIDT T4N-R65W-S19 L01_FINAL PACKET	.pdf	2/18/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TULO SCHMIDT T4N-R65W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	7/5/2016	STEM Engineering Evaluation Spreadsheet
TULO SCHMIDT T4N-R65W-S19 L01_SIGNED EVAL	.pdf	7/16/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TULO SCHMIDT T4N-R65W-S19 L01_FINAL PACKET	.pdf	3/24/2016	Work Request
TULO SCHMIDT T4N-R65W-S19 L01_FINAL PACKET	.pdf	6/1/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TULO SCHMIDT T4N-R65W-S19 L01_FINAL PACKET	.pdf	6/20/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TULO SCHMIDT T4N-R65W-S19 L01_FINAL PACKET	.pdf	6/20/2016	IR Verification Field Data Sheet
TULO SCHMIDT T4N-R65W-S19 L01_1155_NORMAL	.mp4	6/20/2016	IR Camera Video Normal Operations
TULO SCHMIDT T4N-R65W-S19 L01_1156_DUMP	.mp4	6/20/2016	IR Camera Video During Dump Event
TULO SCHMIDT T4N-R65W-S19 L01_1157_POST	.mp4	6/20/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TULO SCHMIDT T4N-R65W-S19 L01_SIGNED EVAL	.pdf	7/16/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** TULO SCHMIDT T4N-R65W-S19 L01\_1157

**Consent Decree Tank System Number:** 135

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,201</b>	<b>2,201</b>	
Total VCS Capacity (scfh)	<b>6,290</b>	<b>6,801</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,208</b>	<b>2,718</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Justin Frahm  
 Audit Document Review Date: 4/3/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 4/24/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TULO SCHMIDT T4N-R65W-S19 L01\_1157**

Consent Decree Tank System Number: **135**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TULO SCHMIDT T4N-R65W-S19 L01\_1157**

Consent Decree Tank System Number: **135**

**Audit Notes**

Tornado ECD size is not specified in any field documentation. SLR assumes that the ECD is 48", per the Signed Engineering Evaluation (TULO SCHMIDT T4N-R65W-S19 L01\_SIGNED EVAL).

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TURMAN RAY T7N-R63W-S32 L01**

Consent Decree Tank System Number: **1709**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
TURMAN RAY T7N-R63W-S32 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
TURMAN RAY T7N-R63W-S32 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
TURMAN RAY T7N-R63W-S32 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
TURMAN RAY T7N-R63W-S32 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
TURMAN RAY T7N-R63W-S32 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
TURMAN RAY T7N-R63W-S32 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
TURMAN RAY T7N-R63W-S32 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
TURMAN RAY T7N-R63W-S32 L01_1756_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
TURMAN RAY T7N-R63W-S32 L01_1756_NORMAL	.mp4	7/11/2018	IR Camera Video During Dump Event
TURMAN RAY T7N-R63W-S32 L01_1756_NORMAL	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
TURMAN RAY T7N-R63W-S32 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **TURMAN RAY T7N-R63W-S32 L01**

**Consent Decree Tank System Number:** **1709**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,683</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,088</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,145</b>	<b>2,145</b>	
Total VCS Capacity (scfh)	<b>6,233</b>	<b>6,745</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,552</b>	<b>3,062</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/20/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TURMAN RAY T7N-R63W-S32 L01**

Consent Decree Tank System Number: **1709**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

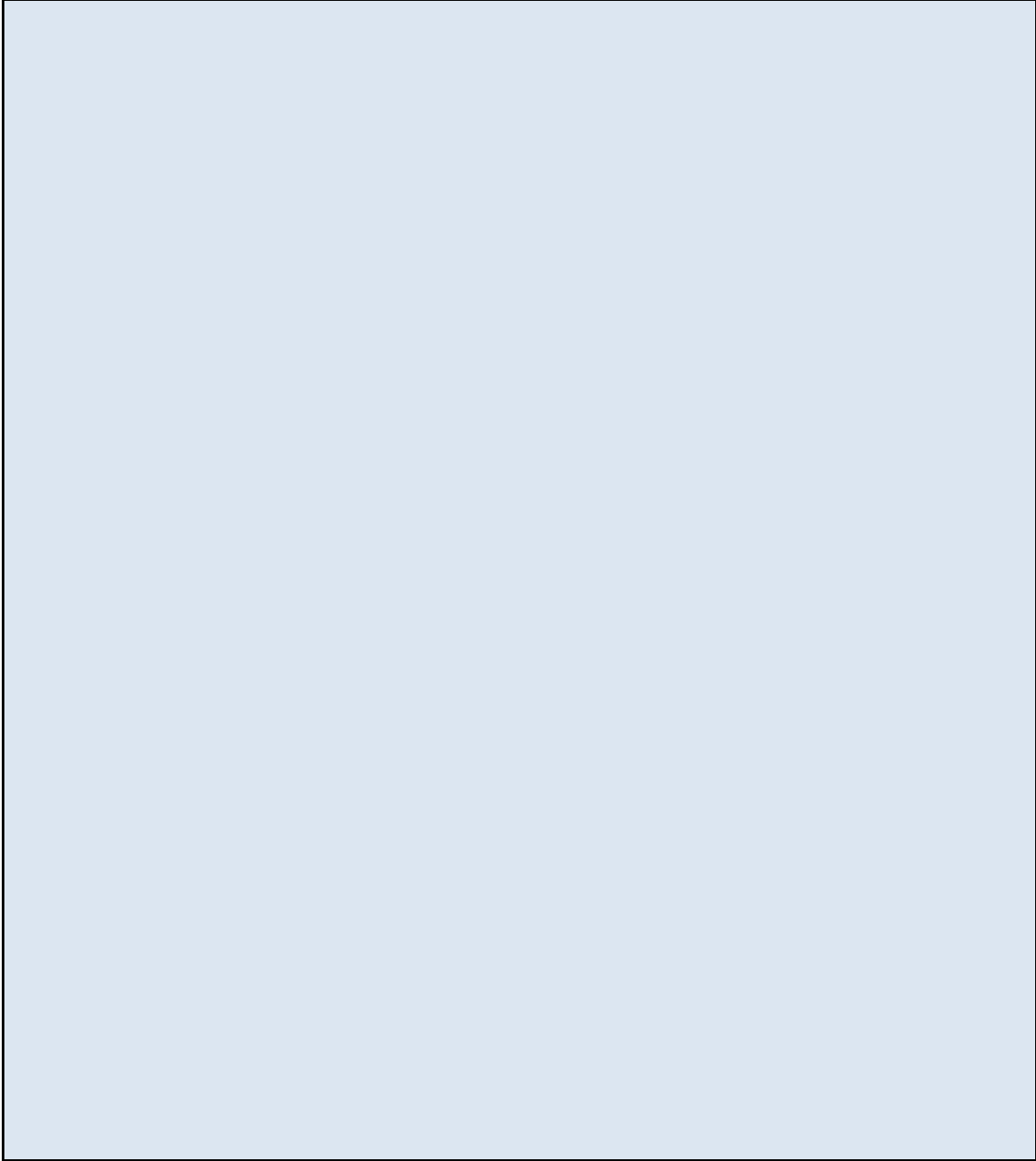
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,683</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **TURMAN RAY T7N-R63W-S32 L01**

Consent Decree Tank System Number: **1709**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UHRICH T6N-R64W-S29 L01**

Consent Decree Tank System Number: **2154**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
UHRICH T6N-R64W-S29 L01_FINAL PACKET	.pdf	2/1/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
UHRICH T6N-R64W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
UHRICH T6N-R64W-S29 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
UHRICH T6N-R64W-S29 L01_FINAL PACKET	.pdf	2/1/2016	Work Request
UHRICH T6N-R64W-S29 L01_FINAL PACKET	.pdf	2/1/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
UHRICH T6N-R64W-S29 L01_WALKDOWN	.pdf	1/29/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
UHRICH T6N-R64W-S29 L01_IR VERIFICATION	.pdf	1/29/2016	IR Verification Field Data Sheet
UHRICH T6N-R64W-S29 L01_393_NORMAL	.mp4	1/29/2016	IR Camera Video Normal Operations
UHRICH T6N-R64W-S29 L01_394_DUMP	.mp4	1/29/2016	IR Camera Video During Dump Event
UHRICH T6N-R64W-S29 L01_395_POST	.mp4	1/29/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
UHRICH T6N-R64W-S29 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** UHRICH T6N-R64W-S29 L01

**Consent Decree Tank System Number:** 2154

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	<b>2,571</b>	<b>2,571</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,969</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>2,969</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>398</b>	<b>3,262</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 6/8/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/24/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UHRICH T6N-R64W-S29 L01**

Consent Decree Tank System Number: **2154**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>458</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>51.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,152</b>	<b>2,152</b>
Oil Tank Working Rate	<b>181</b>	<b>181</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,571</b>	<b>2,571</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UHRICH T6N-R64W-S29 L01**

Consent Decree Tank System Number: **2154**

**Audit Notes**

**Field Datasheets - Adjacent Location Info**

Field Datasheets (Final Packet, pg 14-18) contain site info from an adjacent location. The adjacent location information was not used in this audit as it does not pertain to this site.

**Oil Dump Valve Size - Unknown**

Field Datasheet (Final Packet, pg 14) shows the current LP separator onsite (Separator 2, Well 19-29) originally had a 1" oil dump valve with 1/2" trim size. The Engineering Evaluation shows the LP separator onsite to currently have a 2" oil dump valve with 3/8" trim.

ITEM A1 of the STEM Walkdown Checklist is checked "yes" indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation, and is therefore 3/8".

A 2" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the LP separator. For the given trim size, 3/8", a 2" valve is the largest valve available to be used, therefore it is the most conservative available valve size option and the Modeling Guideline can be confirmed as being strictly applied.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ULRICH BOULTER T4N-R65W-S21 L01**

Consent Decree Tank System Number: **156**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ULRICH BOULTER T4N-R65W-S21 L01_FINAL PACKET	.pdf	6/22/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ULRICH BOULTER T4N-R65W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	7/5/2016	STEM Engineering Evaluation Spreadsheet
ULRICH BOULTER T4N-R65W-S21 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ULRICH BOULTER T4N-R65W-S21 L01_FINAL PACKET	.pdf	6/22/2016	Work Request
ULRICH BOULTER T4N-R65W-S21 L01_FINAL PACKET	.pdf	6/22/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ULRICH BOULTER T4N-R65W-S21 L01_WALKDOWN	.pdf	6/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ULRICH BOULTER T4N-R65W-S21 L01_IR VERIFICATION	.pdf	6/22/2016	IR Verification Field Data Sheet
ULRICH BOULTER T4N-R65W-S21 L01_1164_NORMAL	.mp4	6/21/2016	IR Camera Video Normal Operations
ULRICH BOULTER T4N-R65W-S21 L01_1165_DUMP	.mp4	6/21/2016	IR Camera Video During Dump Event
ULRICH BOULTER T4N-R65W-S21 L01_1166_POST	.mp4	6/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ULRICH BOULTER T4N-R65W-S21 L01_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **ULRICH BOULTER T4N-R65W-S21 L01**

**Consent Decree Tank System Number:** **156**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,763</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>23,082</b>	<b>23,082</b>	
Total VCS Capacity (scfh)	<b>26,845</b>	<b>27,635</b>	
VCS Capacity minus PPIVF (scfh)	<b>22,099</b>	<b>22,888</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/5/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/5/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ULRICH BOULTER T4N-R65W-S21 L01**

Consent Decree Tank System Number: **156**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

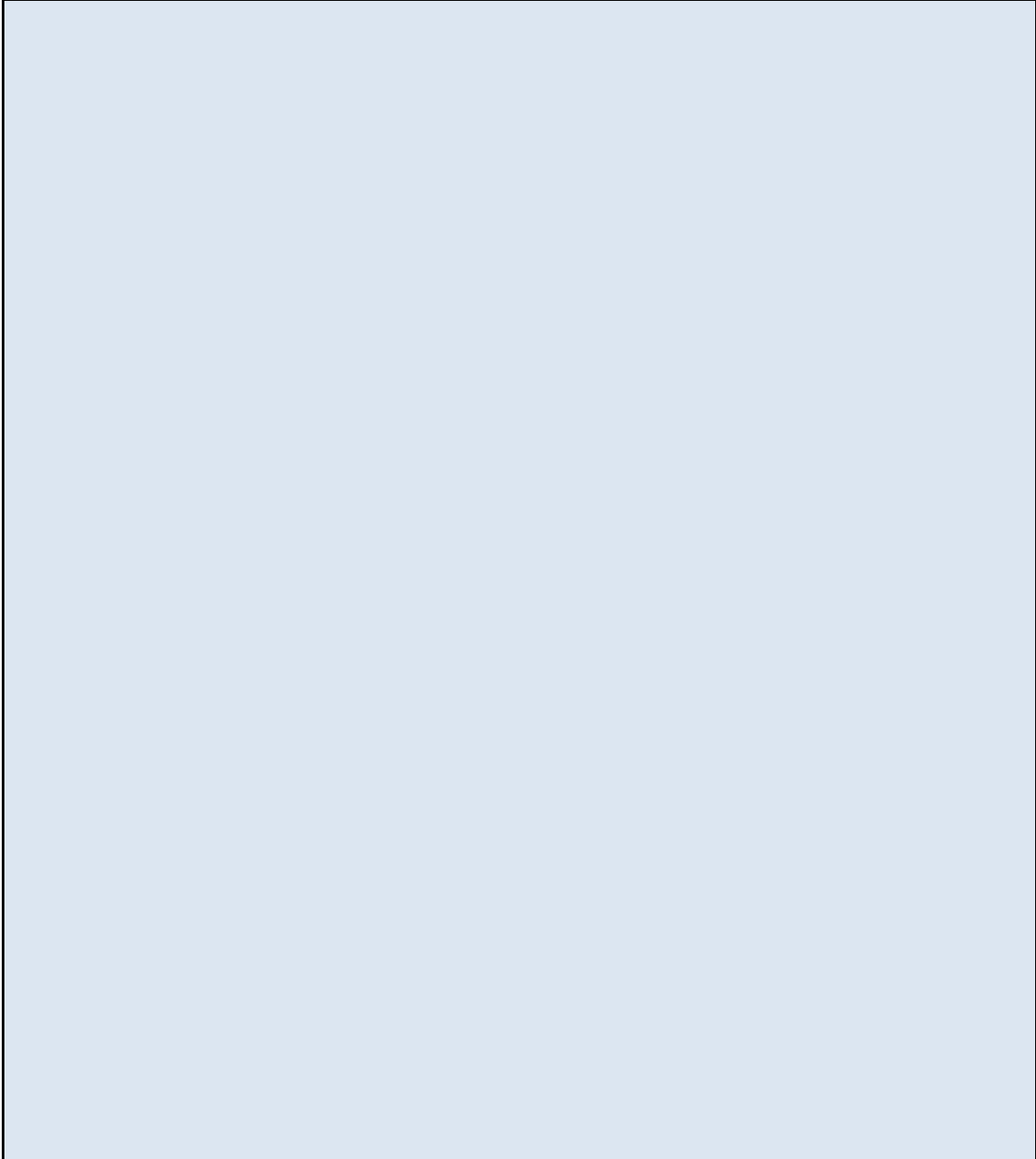
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ULRICH BOULTER T4N-R65W-S21 L01**

Consent Decree Tank System Number: **156**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UNI UPR BOOTH T4N-R64W-S25 L01**

Consent Decree Tank System Number: **496**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UNI UPR BOOTH T4N-R64W-S25 L01_FINAL PACKET	.pdf	1/28/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UNI UPR BOOTH T4N-R64W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	12/20/2016	STEM Engineering Evaluation Spreadsheet
UNI UPR BOOTH T4N-R64W-S25 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UNI UPR BOOTH T4N-R64W-S25 L01_FINAL PACKET	.pdf	1/28/2016	Work Request
UNI UPR BOOTH T4N-R64W-S25 L01_FINAL PACKET	.pdf	1/28/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UNI UPR BOOTH T4N-R64W-S25 L01_FINAL PACKET	.pdf	1/28/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UNI UPR BOOTH T4N-R64W-S25 L01_IR VERIFICATION	.pdf	1/27/2016	IR Verification Field Data Sheet
UNI UPR BOOTH T4N-R64W-S25 L01_0626_NORMAL	.mp4	1/26/2016	IR Camera Video Normal Operations
UNI UPR BOOTH T4N-R64W-S25 L01_0627_DUMP	.mp4	1/26/2016	IR Camera Video During Dump Event
UNI UPR BOOTH T4N-R64W-S25 L01_0628_POST	.mp4	1/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UNI UPR BOOTH T4N-R64W-S25 L01_SIGNED EVAL	.pdf	1/6/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **UNI UPR BOOTH T4N-R64W-S25 L01**

**Consent Decree Tank System Number:** **496**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,824</b>	<b>3,825</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,048</b>	<b>2,048</b>	
Total VCS Capacity (scfh)	<b>5,600</b>	<b>6,648</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,776</b>	<b>2,823</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 12/27/2017  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/3/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UNI UPR BOOTH T4N-R64W-S25 L01**

Consent Decree Tank System Number: **496**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>3,049</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,824</b>

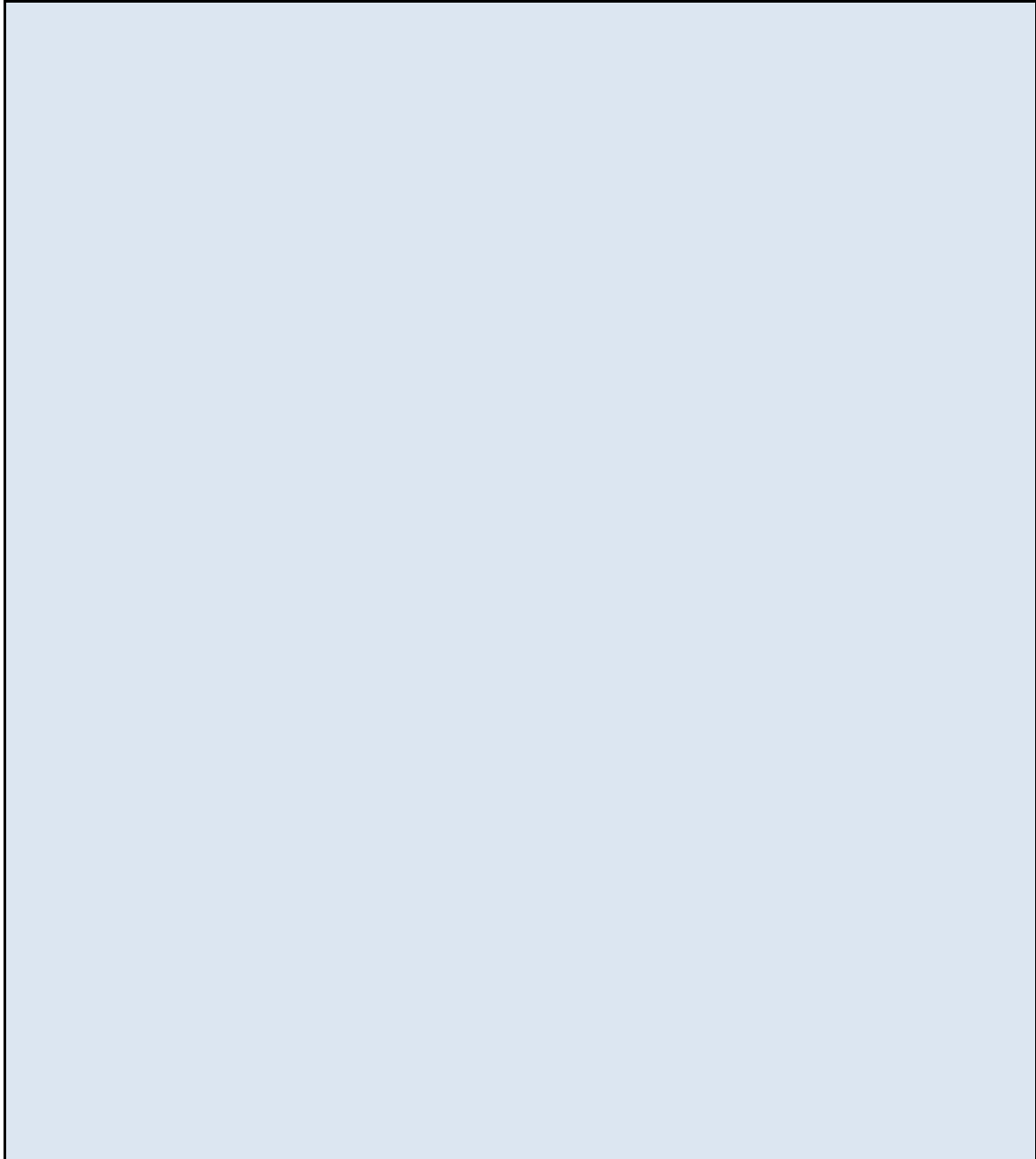


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UNI UPR BOOTH T4N-R64W-S25 L01**

Consent Decree Tank System Number: **496**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC CHEWY T5N-R64W-S23 L01**

Consent Decree Tank System Number: **315**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRC CHEWY T5N-R64W-S23 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHEWY T5N-R64W-S23 L01_STEM Engineering Evaluation_rev1_corrected	.xlsm	11/14/2018	STEM Engineering Evaluation Spreadsheet
UPRC CHEWY T5N-R64W-S23 L01_SIGNED EVAL_REV	.pdf	11/14/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHEWY T5N-R64W-S23 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
UPRC CHEWY T5N-R64W-S23 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHEWY T5N-R64W-S23 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHEWY T5N-R64W-S23 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
UPRC CHEWY T5N-R64W-S23 L01_1387_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
UPRC CHEWY T5N-R64W-S23 L01_1388_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
UPRC CHEWY T5N-R64W-S23 L01_1389_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHEWY T5N-R64W-S23 L01_SIGNED EVAL_REV	.pdf	11/14/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC CHEWY T5N-R64W-S23 L01**

Consent Decree Tank System Number: **315**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,877</b>	<b>1,877</b>	
Total VCS Capacity (scfh)	<b>6,058</b>	<b>6,477</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,976</b>	<b>2,394</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC CHEWY T5N-R64W-S23 L01**

Consent Decree Tank System Number: **315**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC CHEWY T5N-R64W-S23 L01**

Consent Decree Tank System Number: **315**

**Audit Notes**

The stem work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 23-27 of the Final Packet) does it confirm this task was completed

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 7/7/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed."

The signed eval and stem engineering evaluation modeled the site as having 1 headspace tank however nowhere in the final packet does it verify there is a tank used for headspace at the site.

Noble provided a response to the above discrepancy on 11/14/2018 that states "An engineering review of this facility was completed on or around 9/17/2018, this review confirmed there was not a request for a tank to be converted to a headspace tank."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01**

Consent Decree Tank System Number: **310/1016**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_FINAL PACKET	.pdf	2/12/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_STEM Engineering	.xlsm	9/1/2016	STEM Engineering Evaluation Spreadsheet
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_Final Signed STEM Plan	.pdf	10/19/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_FINAL PACKET	.pdf	2/12/2018	Work Request
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_FINAL PACKET	.pdf	2/12/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_WALKDOWN	.pdf	8/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_IR VERIFICATION	.pdf	8/12/2016	IR Verification Field Data Sheet
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_1390_NORMAL	.mp4	8/11/2016	IR Camera Video Normal Operations
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_1391_DUMP	.mp4	8/11/2016	IR Camera Video During Dump Event
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_1392_POST	.mp4	8/11/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01 & UPV T5N-R64W-S23 L01_SIGNED EVAL	.pdf	9/9/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01

**Consent Decree Tank System Number:** 310/1016

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>	<b>65</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,927</b>	<b>7,928</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,145</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>17,346</b>	<b>11,484</b>	
Total VCS Capacity (scfh)	<b>21,491</b>	<b>16,084</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,564</b>	<b>8,156</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 4/9/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 6/5/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01**

Consent Decree Tank System Number: **310/1016**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69	0.69						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.81	0.81						
Gas/Oil Ratio (scf/bbl)	104.5	104.5						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94	0.94						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	535	535						
Vapor Pressure (psia) <sup>c</sup>	78	78						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	760	760						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4	79.4						
Working Flow (Mscfd) <sup>h,i</sup>	7	7						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	17	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	6,613	6,613
Oil Tank Working Rate	602	601
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>7,928</b>	<b>7,927</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC CHWY FERGUSON MONFORT T5N-R64W-S23 L01**

Consent Decree Tank System Number: **310/1016**

**Audit Notes**

The walkdown checklist is not marked complete

- The field datasheets (PG 15 of FINAL PACKET pdf) shows the size of the vapor line was 2" the stem work request form (PG 5 of FINAL PACKET pdf) does not specify a change to diameter. The stem design confirmation form (PG 8 of FINAL PACKET pdf), the signed eval, and the stem engineering evaluation lists the size of the pipe is listed at 3". In this case the engineering design standard has not been strictly followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC EPHRAIM FORD T3N-R65W-S13 L01**

Consent Decree Tank System Number: **697**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRC EPHRAIM FORD T3N-R65W-S13 L01_FINAL PACKET	.pdf	1/16/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRC EPHRAIM FORD T3N-R65W-S13 L01_STEM Engineering Evaluation_rev1	.xls	1/17/2017	STEM Engineering Evaluation Spreadsheet
UPRC EPHRAIM FORD T3N-R65W-S13 L01_Final Signed STEM Plan	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRC EPHRAIM FORD T3N-R65W-S13 L01_FINAL PACKET	.pdf	1/16/2017	Work Request
UPRC EPHRAIM FORD T3N-R65W-S13 L01_FINAL PACKET	.pdf	1/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRC EPHRAIM FORD T3N-R65W-S13 L01_WALKDOWN	.pdf	1/16/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRC EPHRAIM FORD T3N-R65W-S13 L01_IR VERIFICATION	.pdf	1/16/2017	IR Verification Field Data Sheet
UPRC EPHRAIM FORD T3N-R65W-S13 L01_0031_NORMAL	.mp4	1/16/2017	IR Camera Video Normal Operations
UPRC EPHRAIM FORD T3N-R65W-S13 L01_0032_DUMP	.mp4	1/16/2017	IR Camera Video During Dump Event
UPRC EPHRAIM FORD T3N-R65W-S13 L01_0033_POST	.mp4	1/16/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRC EPHRAIM FORD T3N-R65W-S13 L01_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC EPHRAIM FORD T3N-R65W-S13 L01**

Consent Decree Tank System Number: **697**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,558</b>	<b>4,559</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,740</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>6,178</b>	<b>6,178</b>	
Total VCS Capacity (scfh)	<b>9,918</b>	<b>10,731</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,360</b>	<b>6,172</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 2/26/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 6/5/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC EPHRAIM FORD T3N-R65W-S13 L01**

Consent Decree Tank System Number: **697**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,559</b>	<b>4,558</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC EPHRAIM FORD T3N-R65W-S13 L01**

Consent Decree Tank System Number: **697**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC FERGUSON T5N-R64W-S23 L01**

Consent Decree Tank System Number: **921**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRC FERGUSON T5N-R64W-S23 L01_FINAL PACKET	.pdf	5/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRC FERGUSON T5N-R64W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	5/16/2016	STEM Engineering Evaluation Spreadsheet
UPRC FERGUSON T5N-R64W-S23 L01_Final Signed STEM Plan	.pdf	7/5/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRC FERGUSON T5N-R64W-S23 L01_FINAL PACKET	.pdf	5/11/2016	Work Request
UPRC FERGUSON T5N-R64W-S23 L01_FINAL PACKET	.pdf	5/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRC FERGUSON T5N-R64W-S23 L01_WALKDOWN	.pdf	5/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRC FERGUSON T5N-R64W-S23 L01_IR VERIFICATION	.pdf	5/10/2016	IR Verification Field Data Sheet
UPRC FERGUSON T5N-R64W-S23 L01_0939_NORMAL	.mp4	5/4/2016	IR Camera Video Normal Operations
UPRC FERGUSON T5N-R64W-S23 L01_0940_DUMP	.mp4	5/4/2016	IR Camera Video During Dump Event
UPRC FERGUSON T5N-R64W-S23 L01_0941_POST	.mp4	5/4/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRC FERGUSON T5N-R64W-S23 L01_SIGNED EVAL	.pdf	5/18/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC FERGUSON T5N-R64W-S23 L01**

Consent Decree Tank System Number: **921**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,768</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>501</b>	<b>501</b>	
Total VCS Capacity (scfh)	<b>4,269</b>	<b>5,101</b>	
VCS Capacity minus PPIVF (scfh)	<b>825</b>	<b>1,656</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess

Audit Document Review Date: 2/27/2018

Audit Document Review Verified by: Craig Bock

Audit Document Verification Date: 8/31/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC FERGUSON T5N-R64W-S23 L01**

Consent Decree Tank System Number: **921**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.94							
Valve Coefficient (gpm/psi) (C)	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
Total	3,445	3,444

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC FERGUSON T5N-R64W-S23 L01**

Consent Decree Tank System Number: **921**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.  
CB - No additional information is needed for this verification.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC FIVE RIVERS T4N-R66W-S16 L01**

Consent Decree Tank System Number: **180**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRC FIVE RIVERS T4N-R66W-S16 L01_FINAL PACKET	.pdf	12/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRC FIVE RIVERS T4N-R66W-S16 L01_STEM Engineering Evaluation_rev1	.xls	6/27/2017	STEM Engineering Evaluation Spreadsheet
UPRC FIVE RIVERS T4N-R66W-S16 L01_Final Signed STEM Plan	.pdf	12/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRC FIVE RIVERS T4N-R66W-S16 L01_FINAL PACKET	.pdf	12/30/2015	Work Request
UPRC FIVE RIVERS T4N-R66W-S16 L01_FINAL PACKET	.pdf	12/30/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRC FIVE RIVERS T4N-R66W-S16 L01_WALKDOWN	.pdf	12/30/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRC FIVE RIVERS T4N-R66W-S16 L01_IR VERIFICATION	.pdf	12/29/2015	IR Verification Field Data Sheet
UPRC FIVE RIVERS T4N-R66W-S16 L01_0552_NORMAL	.mp4	12/28/2015	IR Camera Video Normal Operations
UPRC FIVE RIVERS T4N-R66W-S16 L01_0553_DUMP	.mp4	12/28/2015	IR Camera Video During Dump Event
UPRC FIVE RIVERS T4N-R66W-S16 L01_0554_POST	.mp4	12/28/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRC FIVE RIVERS T4N-R66W-S16 L01_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC FIVE RIVERS T4N-R66W-S16 L01**

Consent Decree Tank System Number: **180**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,224</b>	<b>13,226</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,853</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>20,540</b>	<b>20,540</b>	
Total VCS Capacity (scfh)	<b>26,393</b>	<b>32,207</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,169</b>	<b>18,981</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Jesse Hanshaw  
 Audit Document Verification Date: 11/15/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC FIVE RIVERS T4N-R66W-S16 L01**

Consent Decree Tank System Number: **180**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>23</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>13,226</b>	<b>13,224</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC FIVE RIVERS T4N-R66W-S16 L01**

Consent Decree Tank System Number: **180**

### Audit Notes

The walkdown checklist is not marked complete

The work request (pg 3 FINAL PACKET) states that the VOC line header for tanks 72708 and 72711 needs to be increased from 2" to 3" and ran to the same KO as tanks 360646 and 360645. There is no verification that this work was completed (pg 20-25 FINAL PACKET).

#### NOBLE REQUEST:

Field verification for this facility was completed on or around 12/2/2015, field verification confirmed that the 3" VOC line from the tanks to the KO pot was installed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC SHELTON T3N-R65W-S1 L04**

Consent Decree Tank System Number: **708**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRC SHELTON T3N-R65W-S1 L04_FINAL PACKET	.pdf	12/27/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRC SHELTON T3N-R65W-S1 L04_STEM Engineering Evaluation_rev1	.xls	1/17/2017	STEM Engineering Evaluation Spreadsheet
UPRC SHELTON T3N-R65W-S1 L04_Final Signed STEM Plan	.pdf	1/31/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRC SHELTON T3N-R65W-S1 L04_FINAL PACKET	.pdf	12/27/2016	Work Request
UPRC SHELTON T3N-R65W-S1 L04_FINAL PACKET	.pdf	12/27/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRC SHELTON T3N-R65W-S1 L04_WALKDOWN	.pdf	12/27/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRC SHELTON T3N-R65W-S1 L04_IR VERIFICATION	.pdf	12/27/2016	IR Verification Field Data Sheet
UPRC SHELTON T3N-R65W-S1 L04_1824_NORMAL	.mp4	12/22/2016	IR Camera Video Normal Operations
UPRC SHELTON T3N-R65W-S1 L04_1825_DUMP	.mp4	12/22/2016	IR Camera Video During Dump Event
UPRC SHELTON T3N-R65W-S1 L04_1826_POST	.mp4	12/22/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRC SHELTON T3N-R65W-S1 L04_SIGNED EVAL	.pdf	1/17/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC SHELTON T3N-R65W-S1 L04**

Consent Decree Tank System Number: **708**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,320</b>	<b>4,321</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,647</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>4,499</b>	<b>4,499</b>	
Total VCS Capacity (scfh)	<b>7,146</b>	<b>10,332</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,826</b>	<b>6,011</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 4/2/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/12/2018

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC SHELTON T3N-R65W-S1 L04**

Consent Decree Tank System Number: **708**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,321</b>	<b>4,320</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC SHELTON T3N-R65W-S1 L04**

Consent Decree Tank System Number: **708**

**Audit Notes**

The walkdown checklist is not marked complete

CB - There is no confirmation in the Job Sheets that the existing 212 HLP LP oil dump was replaced with a 1" 1400 with a 1/2" trim (as requested on the Work Request.

Assume Item A1 of the Retrofit Walkdown Checklist is confirmation from the client that the oil dump valve was replaced.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC T3N-R65W-S23 L02**

Consent Decree Tank System Number: **405**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRC T3N-R65W-S23 L02_FINAL PACKET	.pdf	1/25/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRC T3N-R65W-S23 L02_STEM Engineering Evaluation_rev1	.xlsm	8/9/2018	STEM Engineering Evaluation Spreadsheet
UPRC T3N-R65W-S23 L02_SIGNED EVAL	.pdf	8/20/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRC T3N-R65W-S23 L02_FINAL PACKET	.pdf	1/25/2016	Work Request
UPRC T3N-R65W-S23 L02_FINAL PACKET	.pdf	1/25/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRC T3N-R65W-S23 L02_WALKDOWN	.pdf	1/25/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRC T3N-R65W-S23 L02_IR VERIFICATION	.pdf	1/22/2016	IR Verification Field Data Sheet
UPRC T3N-R65W-S23 L02_0605_NORMAL	.mp4	1/22/2016	IR Camera Video Normal Operations
UPRC T3N-R65W-S23 L02_0606_DUMP	.mp4	1/22/2016	IR Camera Video During Dump Event
UPRC T3N-R65W-S23 L02_0607_POST	.mp4	1/22/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRC T3N-R65W-S23 L02_SIGNED EVAL	.pdf	8/20/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** UPRC T3N-R65W-S23 L02

**Consent Decree Tank System Number:** 405

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>12,986</b>	<b>12,988</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,129</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>13,667</b>	<b>13,667</b>	
Total VCS Capacity (scfh)	<b>17,796</b>	<b>18,267</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,810</b>	<b>5,279</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 8/28/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/2/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC T3N-R65W-S23 L02**

Consent Decree Tank System Number: **405**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

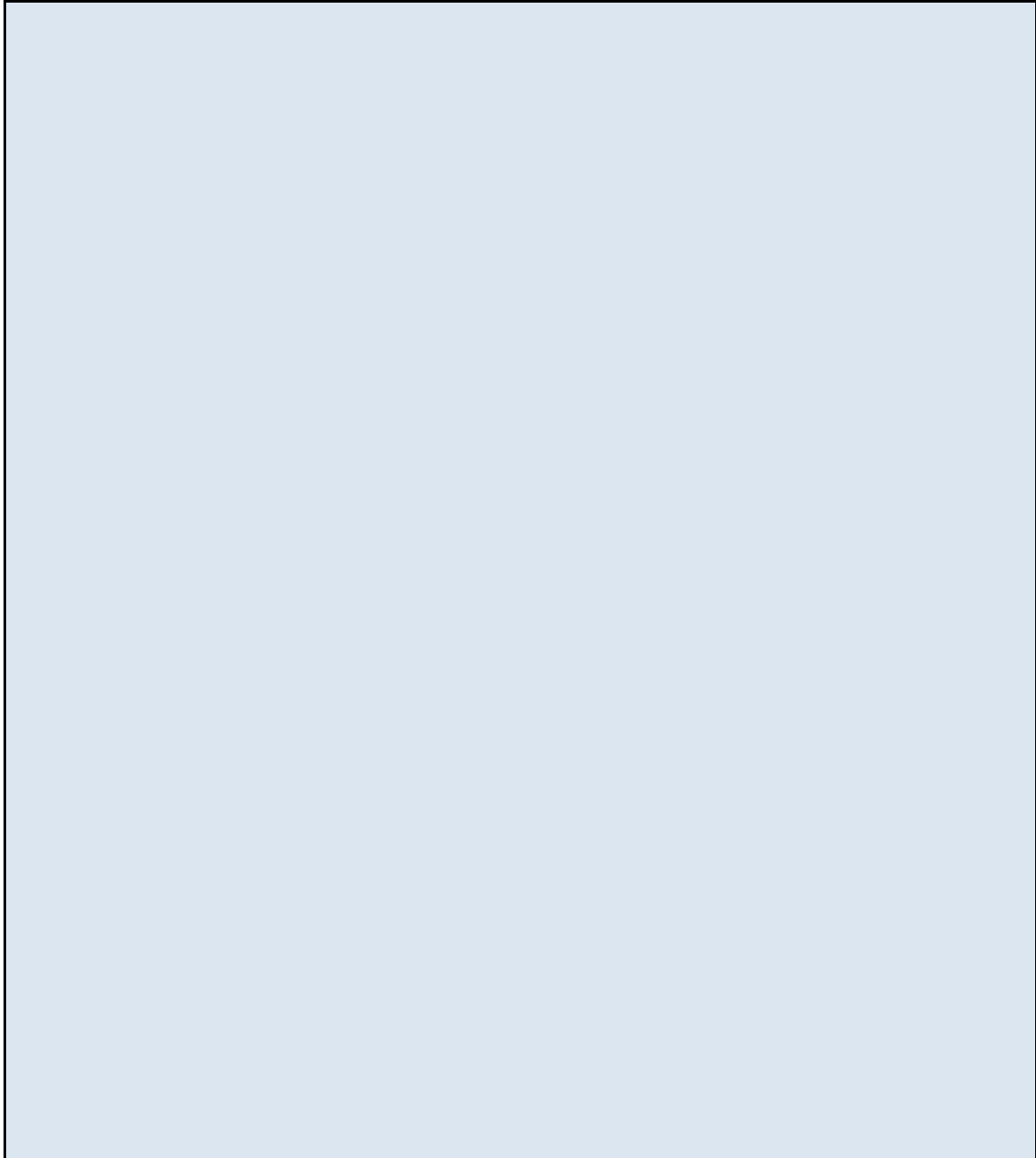
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>12,988</b>	<b>12,986</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC T3N-R65W-S23 L02**

Consent Decree Tank System Number: **405**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC T4N-R66W-S33 L01**  
 Consent Decree Tank System Number: **857**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRC T4N-R66W-S33 L01_FINAL PACKET	.pdf	12/15/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRC T4N-R66W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	12/16/2016	STEM Engineering Evaluation Spreadsheet
UPRC T4N-R66W-S33 L01_SIGNED EVAL	.pdf	12/19/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRC T4N-R66W-S33 L01_FINAL PACKET	.pdf	12/15/2016	Work Request
UPRC T4N-R66W-S33 L01_FINAL PACKET	.pdf	12/15/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRC T4N-R66W-S33 L01_FINAL PACKET	.pdf	12/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRC T4N-R66W-S33 L01_IR VERIFICATION	.pdf	12/14/2016	IR Verification Field Data Sheet
UPRC T4N-R66W-S33 L01_1707_NORMAL	.mp4	12/14/2016	IR Camera Video Normal Operations
UPRC T4N-R66W-S33 L01_1708_DUMP	.mp4	12/14/2016	IR Camera Video During Dump Event
UPRC T4N-R66W-S33 L01_1709_POST	.mp4	12/14/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRC T4N-R66W-S33 L01_SIGNED EVAL	.pdf	12/19/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC T4N-R66W-S33 L01**

Consent Decree Tank System Number: **857**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>538</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,204</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,136</b>	<b>1,889</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 12/27/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 4/23/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC T4N-R66W-S33 L01**

Consent Decree Tank System Number: **857**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRC T4N-R66W-S33 L01**

Consent Decree Tank System Number: **857**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 11-17) are not dated. Assumed the date is the same as Facility Scouting date (6/9/2016).

**2. Single Oil Tank Liquid Level**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRR PAN AM T3N-R65W-S35 L01\_FINAL PACKET**

Consent Decree Tank System Number: **2220**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPRR PAN AM T3N-R65W-S35 L01_FINAL PACKET	.pdf	8/8/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPRR PAN AM T3N-R65W-S35 L01_STEM Engineering Evaluation_rev1	.xlsm	8/8/2018	STEM Engineering Evaluation Spreadsheet
UPRR PAN AM T3N-R65W-S35 L01_FINAL PACKET	.pdf	8/8/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPRR PAN AM T3N-R65W-S35 L01_FINAL PACKET	.pdf	8/8/2018	Work Request
UPRR PAN AM T3N-R65W-S35 L01_FINAL PACKET	.pdf	8/8/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPRR PAN AM T3N-R65W-S35 L01_WALKDOWN	.pdf	8/27/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPRR PAN AM T3N-R65W-S35 L01_IR VERIFICATION	.pdf	8/7/2018	IR Verification Field Data Sheet
UPRR PAN AM T3N-R65W-S35 L01_2234_NORMAL	.mp4	8/6/2018	IR Camera Video Normal Operations
UPRR PAN AM T3N-R65W-S35 L01_2235_DUMP	.mp4	8/6/2018	IR Camera Video During Dump Event
UPRR PAN AM T3N-R65W-S35 L01_2236_POST	.mp4	8/6/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPRR PAN AM T3N-R65W-S35 L01_SIGNED EVAL	.pdf	8/10/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRR PAN AM T3N-R65W-S35 L01\_FINAL PACKET**

Consent Decree Tank System Number: **2220**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>4,006</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>759</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,786</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>941</b>	<b>952</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 8/28/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/25/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRR PAN AM T3N-R65W-S35 L01\_FINAL PACKET**

Consent Decree Tank System Number: **2220**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	794							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	82.9							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,454	3,307
Oil Tank Working Rate	314	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,006</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPRR PAN AM T3N-R65W-S35 L01\_FINAL PACKET**

Consent Decree Tank System Number: **2220**

**Audit Notes**

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Oil Dump Valve Size**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. The trim size is confirmed on the Job Sheet, page 21 of Final Packet. Conservatively assumed the valve to be 2", the largest available size for 1/2" trim, the Modeling Guideline cannot be considered strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SADIE BOOTH T4N-R63W-S31 L01**

Consent Decree Tank System Number: **1013**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPV SADIE BOOTH T4N-R63W-S31 L01_FINAL PACKET	.pdf	8/2/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPV SADIE BOOTH T4N-R63W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	8/5/2016	STEM Engineering Evaluation Spreadsheet
UPV SADIE BOOTH T4N-R63W-S31 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPV SADIE BOOTH T4N-R63W-S31 L01_FINAL PACKET	.pdf	8/2/2016	Work Request
UPV SADIE BOOTH T4N-R63W-S31 L01_FINAL PACKET	.pdf	8/2/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPV SADIE BOOTH T4N-R63W-S31 L01_FINAL PACKET	.pdf	8/2/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPV SADIE BOOTH T4N-R63W-S31 L01_IR VERIFICATION	.pdf	7/27/2016	IR Verification Field Data Sheet
UPV SADIE BOOTH T4N-R63W-S31 L01_1327_NORMAL	.mp4	7/25/2016	IR Camera Video Normal Operations
UPV SADIE BOOTH T4N-R63W-S31 L01_1328_DUMP	.mp4	7/25/2016	IR Camera Video During Dump Event
UPV SADIE BOOTH T4N-R63W-S31 L01_1329_POST	.mp4	7/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPV SADIE BOOTH T4N-R63W-S31 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SADIE BOOTH T4N-R63W-S31 L01**

Consent Decree Tank System Number: **1013**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>19,917</b>	<b>19,917</b>	
Total VCS Capacity (scfh)	<b>24,006</b>	<b>24,517</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,498</b>	<b>20,008</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 12/27/2017  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/3/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SADIE BOOTH T4N-R63W-S31 L01**

Consent Decree Tank System Number: **1013**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C)	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C)								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

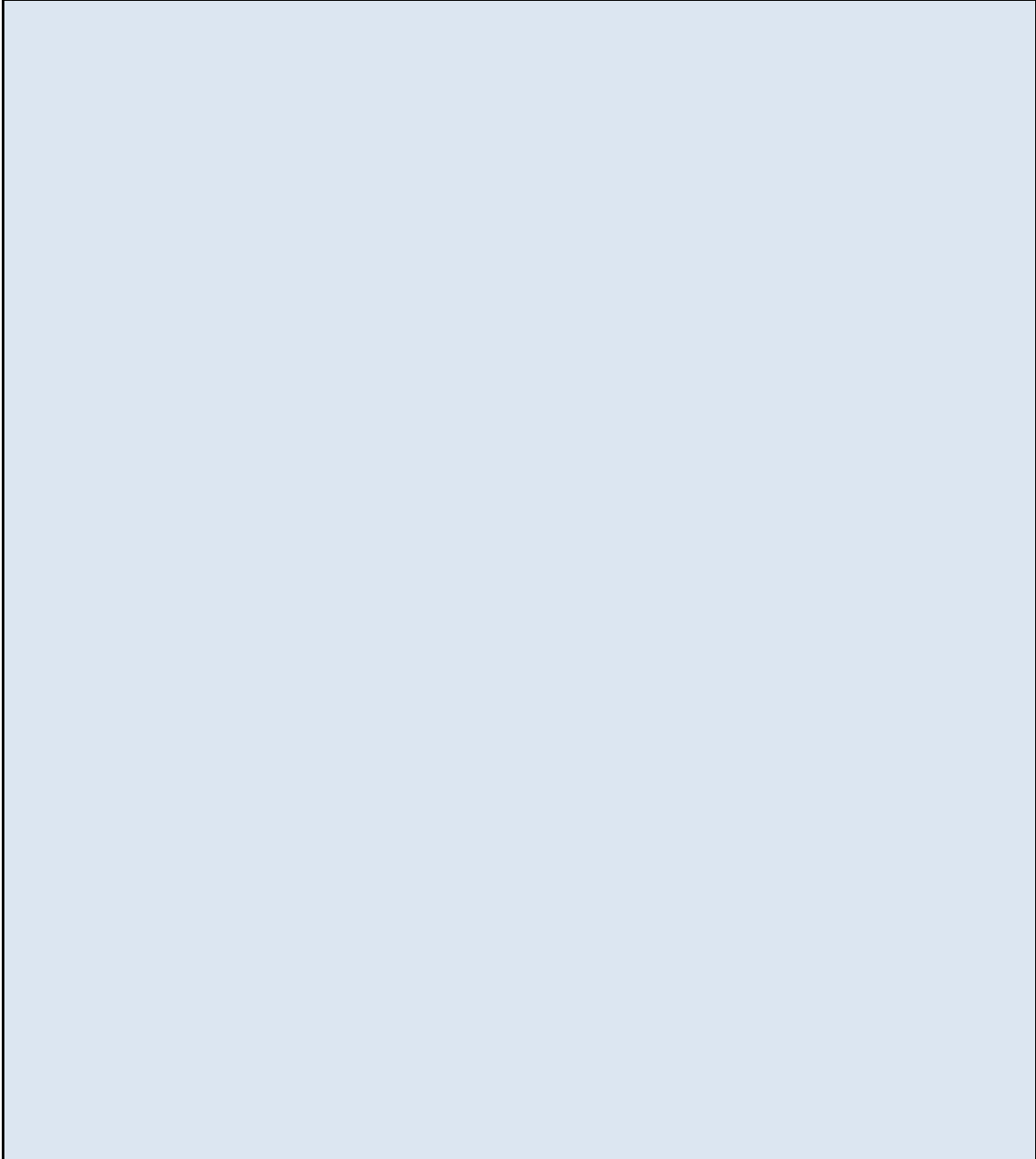
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SADIE BOOTH T4N-R63W-S31 L01**

Consent Decree Tank System Number: **1013**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SATER T4N-R64W-S13 L01**

Consent Decree Tank System Number: **472**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L01_FINAL PACKET	.pdf	8/8/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L01_STEM Engineering Evaluation_rev1	.xlsm	8/18/2017	STEM Engineering Evaluation Spreadsheet
UPV SATER T4N-R64W-S13 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L01_FINAL PACKET	.pdf	8/8/2017	Work Request
UPV SATER T4N-R64W-S13 L01_FINAL PACKET	.pdf	8/8/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L01_WALKDOWN	.pdf	8/8/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L01_IR VERIFICATION	.pdf	8/7/2017	IR Verification Field Data Sheet
UPV SATER T4N-R64W-S13 L01_2224_NORMAL	.mp4	8/6/2017	IR Camera Video Normal Operations
UPV SATER T4N-R64W-S13 L01_2225_DUMP	.mp4	8/6/2017	IR Camera Video During Dump Event
UPV SATER T4N-R64W-S13 L01_2226_POST	.mp4	8/6/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SATER T4N-R64W-S13 L01**

Consent Decree Tank System Number: **472**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,433</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,483</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>2,066</b>	<b>2,066</b>	
Total VCS Capacity (scfh)	<b>5,549</b>	<b>7,024</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,244</b>	<b>3,592</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/23/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SATER T4N-R64W-S13 L01**

Consent Decree Tank System Number: **472**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,433</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SATER T4N-R64W-S13 L01**

Consent Decree Tank System Number: **472**

**Audit Notes**

The Work Request indicated the oil dump valve on the HLP Separator was to be modified to Kimray 1400 with 1/2 inch trims. Could not verify the oil dump valve size (2" or 1") on the separator with the documentation provided. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SATER T4N-R64W-S13 L02**

Consent Decree Tank System Number: **473**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L02_FINAL PACKET	.pdf	4/25/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L02_STEM Engineering Evaluation_rev1	.xlsm	4/25/2017	STEM Engineering Evaluation Spreadsheet
UPV SATER T4N-R64W-S13 L02_Final Signed STEM Plan	.pdf	7/12/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L02_FINAL PACKET	.pdf	4/25/2017	Work Request
UPV SATER T4N-R64W-S13 L02_FINAL PACKET	.pdf	4/25/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L02_WALKDOWN	.pdf	4/25/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L02_IR VERIFICATION	.pdf	4/25/2017	IR Verification Field Data Sheet
UPV SATER T4N-R64W-S13 L02_1975_NORMAL	.mp4	4/24/2017	IR Camera Video Normal Operations
UPV SATER T4N-R64W-S13 L02_1976_DUMP	.mp4	4/24/2017	IR Camera Video During Dump Event
UPV SATER T4N-R64W-S13 L02_1977_POST	.mp4	4/24/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPV SATER T4N-R64W-S13 L02_SIGNED EVAL	.pdf	7/6/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **UPV SATER T4N-R64W-S13 L02**

**Consent Decree Tank System Number:** **473**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,371</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>19,951</b>	<b>19,951</b>	
Total VCS Capacity (scfh)	<b>23,322</b>	<b>24,551</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,576</b>	<b>19,804</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SATER T4N-R64W-S13 L02**

Consent Decree Tank System Number: **473**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>17</b>	

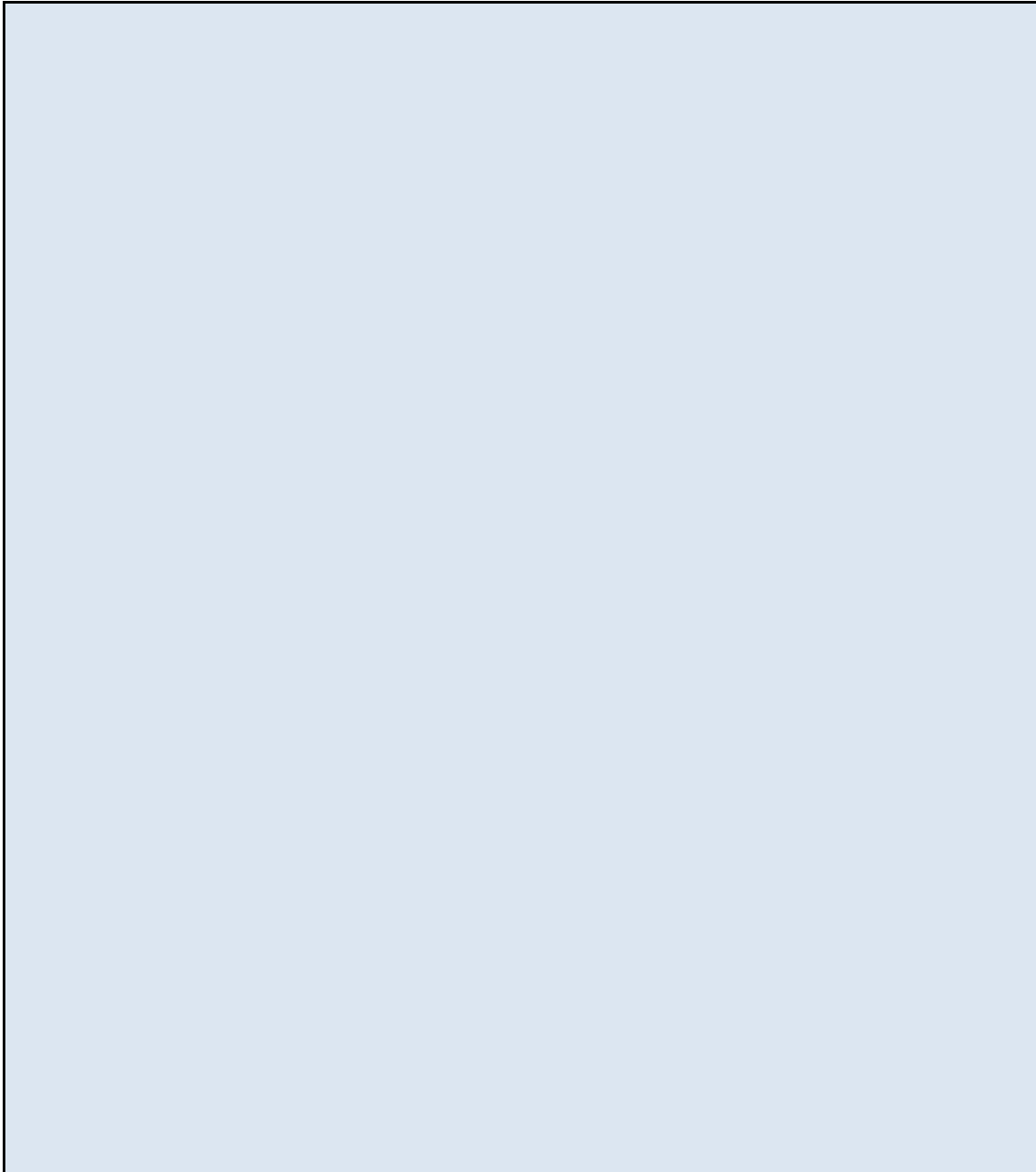
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV SATER T4N-R64W-S13 L02**

Consent Decree Tank System Number: **473**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T4N-R64W-S13 L03**

Consent Decree Tank System Number: **979**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S13 L03_FINAL PACKET	.pdf	8/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S13 L03_STEM Engineering Evaluation_rev1	.xlsm	4/24/2017	STEM Engineering Evaluation Spreadsheet
UPV T4N-R64W-S13 L03_SIGNED EVAL	.pdf	4/25/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S13 L03_FINAL PACKET	.pdf	8/17/2016	Work Request
UPV T4N-R64W-S13 L03_FINAL PACKET	.pdf	3/7/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S13 L03_WALKDOWN	.pdf	4/20/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S13 L03_IR VERIFICATION	.pdf	4/19/2017	IR Verification Field Data Sheet
UPV T4N-R64W-S13 L03_1960_NORMAL	.mp4	4/18/2017	IR Camera Video Normal Operations
UPV T4N-R64W-S13 L03_1961_DUMP	.mp4	4/18/2017	IR Camera Video During Dump Event
UPV T4N-R64W-S13 L03_1962_POST	.mp4	4/18/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S13 L03_SIGNED EVAL	.pdf	4/25/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **UPV T4N-R64W-S13 L03**

**Consent Decree Tank System Number:** **979**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>171</b>	<b>171</b>	
Total VCS Capacity (scfh)	<b>4,198</b>	<b>5,129</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,130</b>	<b>2,060</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Patrick Dilsaver  
 Audit Document Review Date: 11/17/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 2/28/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T4N-R64W-S13 L03**

Consent Decree Tank System Number: **979**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

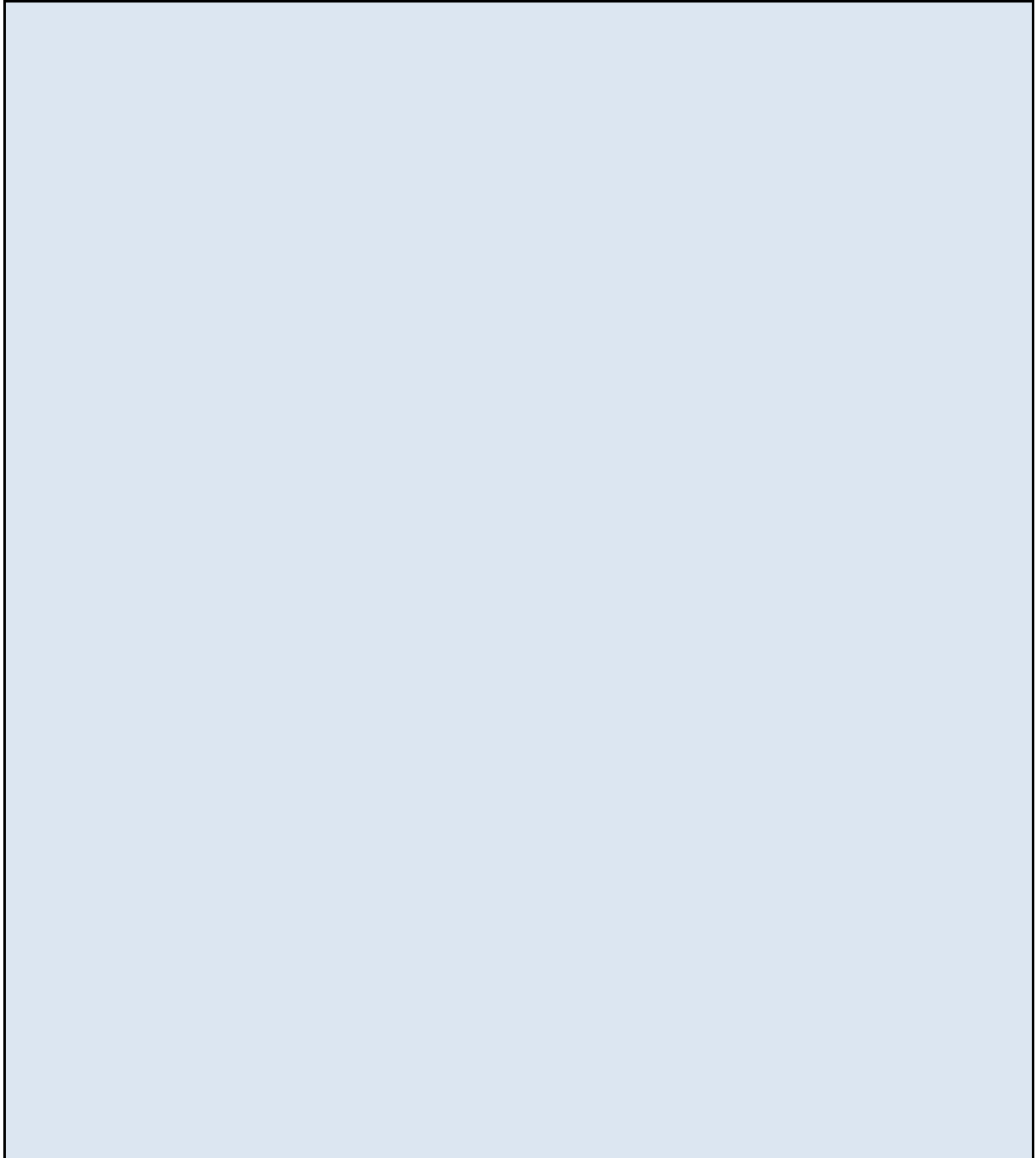
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T4N-R64W-S13 L03**

Consent Decree Tank System Number: **979**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T4N-R64W-S25 L01**

Consent Decree Tank System Number: **982**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S25 L01_FINAL PACKET	.pdf	8/11/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S25 L01_STEM Engineering Evaluation_rev1	.xlsm	9/11/2017	STEM Engineering Evaluation Spreadsheet
UPV T4N-R64W-S25 L01_SIGNED EVAL	.pdf	9/18/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S25 L01_FINAL PACKET	.pdf	8/11/2017	Work Request
UPV T4N-R64W-S25 L01_FINAL PACKET	.pdf	8/11/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S25 L01_WALKDOWN	.pdf	8/11/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S25 L01_IR VERIFICATION	.pdf	3/23/2017	IR Verification Field Data Sheet
UPV T4N-R64W-S25 L01_2272_NORMAL	.mp4	8/10/2017	IR Camera Video Normal Operations
UPV T4N-R64W-S25 L01_2273_DUMP	.mp4	8/10/2017	IR Camera Video During Dump Event
UPV T4N-R64W-S25 L01_2274_POST	.mp4	8/10/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
UPV T4N-R64W-S25 L01_SIGNED EVAL	.pdf	9/18/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T4N-R64W-S25 L01**

Consent Decree Tank System Number: **982**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>393</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,420</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>976</b>	<b>1,514</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T4N-R64W-S25 L01**

Consent Decree Tank System Number: **982**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>727</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>70.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,919</b>	<b>2,919</b>
Oil Tank Working Rate	<b>288</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T4N-R64W-S25 L01**

Consent Decree Tank System Number: **982**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T5N-R63W-S5 L01**

Consent Decree Tank System Number: **1024**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
UPV T5N-R63W-S5 L01_FINAL PACKET	.pdf	1/12/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
UPV T5N-R63W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	1/18/2017	STEM Engineering Evaluation Spreadsheet
UPV T5N-R63W-S5 L01_Final Signed STEM Plan	.pdf	1/31/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
UPV T5N-R63W-S5 L01_FINAL PACKET	.pdf	1/12/2017	Work Request
UPV T5N-R63W-S5 L01_FINAL PACKET	.pdf	1/12/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
UPV T5N-R63W-S5 L01_WALKDOWN	.pdf	1/12/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
UPV T5N-R63W-S5 L01_IR VERIFICATION	.pdf	1/12/2017	IR Verification Field Data Sheet
UPV T5N-R63W-S5 L01_0016_NORMAL	.mp4	1/11/2017	IR Camera Video Normal Operations
UPV T5N-R63W-S5 L01_0017_DUMP	.mp4	1/11/2017	IR Camera Video During Dump Event
UPV T5N-R63W-S5 L01_0018_POST	.mp4	1/11/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
UPV T5N-R63W-S5 L01_SIGNED EVAL	.pdf	1/5/2018	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** UPV T5N-R63W-S5 L01

**Consent Decree Tank System Number:** 1024

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	1
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	2 "
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	4 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	65							
Dump Valve Size & Trim Size (in)	1" & 3/8"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	1			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	2,204	2,204	0%
Calculated Burner Capacity (scfh)	2,812	5,833	
Headspace Surge Capacity (scfh)	0	0	
Total VCS Capacity (scfh)	2,812	5,833	
VCS Capacity minus PPIVF (scfh)	608	3,630	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 5/8/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/14/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T5N-R63W-S5 L01**

Consent Decree Tank System Number: **1024**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.91</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>414</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>43.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>1,802</b>	<b>1,802</b>
Oil Tank Working Rate	<b>164</b>	<b>164</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,204</b>	<b>2,204</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T5N-R63W-S5 L01**

Consent Decree Tank System Number: **1024**

**Audit Notes**

The walkdown checklist is not marked complete

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T6N-R63W-S33 L02**

Consent Decree Tank System Number: **1022**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
UPV T6N-R63W-S33 L02_FINAL PACKET	.pdf	3/27/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
UPV T6N-R63W-S33 L02_STEM Engineering Evaluation_rev1	.xlsm	4/29/2016	STEM Engineering Evaluation Spreadsheet
UPV T6N-R63W-S33 L02_SIGNED EVAL	.pdf	5/3/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
UPV T6N-R63W-S33 L02_FINAL PACKET	.pdf	3/27/2018	Work Request
UPV T6N-R63W-S33 L02_FINAL PACKET	.pdf	3/27/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
UPV T6N-R63W-S33 L02_WALKDOWN	.pdf	4/28/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
UPV T6N-R63W-S33 L02_IR VERIFICATION UPDATE	.pdf	6/16/2016	IR Verification Field Data Sheet
UPV T6N-R63W-S33 L02_0934_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
UPV T6N-R63W-S33 L02_0935_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
UPV T6N-R63W-S33 L02_0936_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
UPV T6N-R63W-S33 L02_SIGNED EVAL	.pdf	5/3/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** UPV T6N-R63W-S33 L02

**Consent Decree Tank System Number:** 1022

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>2,436</b>	<b>2,571</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>2,813</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>2,813</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>377</b>	<b>3,262</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/27/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T6N-R63W-S33 L02**

Consent Decree Tank System Number: **1022**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>4.04</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>458</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>51.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>4</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,152</b>	<b>2,027</b>
Oil Tank Working Rate	<b>181</b>	<b>171</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>2,571</b>	<b>2,436</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **UPV T6N-R63W-S33 L02**

Consent Decree Tank System Number: **1022**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 21) indicates a new LP separator was installed onsite and ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 6) is checked "yes" indicating the oil dump trim is consistent with the Engineering Evaluation, and is therefore 3/8". There is no indication of the oil dump valve size installed in the separator onsite.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the LP separator. For the given trim size, 3/8", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **VETTING T5N-R65W-S26 L01**

Consent Decree Tank System Number: **2340**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
VETTING T5N-R65W-S26 L01_FINAL PACKET	.pdf	11/11/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
VETTING T5N-R65W-S26 L01_STEM Engineering Evaluation_rev1	.xlsm	11/11/2016	STEM Engineering Evaluation Spreadsheet
VETTING T5N-R65W-S26 L01_SIGNED EVAL	.pdf	11/15/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
VETTING T5N-R65W-S26 L01_FINAL PACKET	.pdf	11/11/2016	Work Request
VETTING T5N-R65W-S26 L01_FINAL PACKET	.pdf	11/11/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
VETTING T5N-R65W-S26 L01_WALKDOWN	.pdf	11/8/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
VETTING T5N-R65W-S26 L01_IR VERIFICATION	.pdf	10/31/2017	IR Verification Field Data Sheet
VETTING T5N-R65W-S26 L01_1016_NORMAL	.mp4	10/31/2016	IR Camera Video Normal Operations
VETTING T5N-R65W-S26 L01_1017_DUMP	.mp4	10/31/2016	IR Camera Video During Dump Event
VETTING T5N-R65W-S26 L01_1018_POST	.mp4	10/31/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
VETTING T5N-R65W-S26 L01_SIGNED EVAL	.pdf	11/15/2016	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **VETTING T5N-R65W-S26 L01**

Consent Decree Tank System Number: **2340**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,305</b>	<b>3,307</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,088</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,773</b>	<b>1,773</b>	
Total VCS Capacity (scfh)	<b>5,861</b>	<b>6,373</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,556</b>	<b>3,066</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/18/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/2/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **VETTING T5N-R65W-S26 L01**

Consent Decree Tank System Number: **2340**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,307</b>	<b>3,305</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **VETTING T5N-R65W-S26 L01**

Consent Decree Tank System Number: **2340**

**Audit Notes**

There is conflicting data regarding the manufacturer of tank burner located on site. However, of the two burners in question, the tornado was used in the model as its calculated burner capacity is more conservative than that of the lead burner.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **VOLKENS COLEMAN T4N-R64W-S23 L01**

Consent Decree Tank System Number: **465**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
VOLKENS COLEMAN T4N-R64W-S23 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
VOLKENS COLEMAN T4N-R64W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
VOLKENS COLEMAN T4N-R64W-S23 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
VOLKENS COLEMAN T4N-R64W-S23 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
VOLKENS COLEMAN T4N-R64W-S23 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
VOLKENS COLEMAN T4N-R64W-S23 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
VOLKENS COLEMAN T4N-R64W-S23 L01_IR VERIFICATION UPDATED	.pdf	7/11/2018	IR Verification Field Data Sheet
VOLKENS COLEMAN T4N-R64W-S23 L01_0011_NORMAL UPDATED	.mp4	7/11/2018	IR Camera Video Normal Operations
VOLKENS COLEMAN T4N-R64W-S23 L01_0012_DUMP UPDATED	.mp4	7/11/2018	IR Camera Video During Dump Event
VOLKENS COLEMAN T4N-R64W-S23 L01_0013_POST UPDATED	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
VOLKENS COLEMAN T4N-R64W-S23 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **VOLKENS COLEMAN T4N-R64W-S23 L01**

Consent Decree Tank System Number: **465**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>	<b>1" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,255</b>	<b>9,256</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,989</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>26,107</b>	<b>26,107</b>	
Total VCS Capacity (scfh)	<b>30,096</b>	<b>30,707</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,841</b>	<b>21,451</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **VOLKENS COLEMAN T4N-R64W-S23 L01**

Consent Decree Tank System Number: **465**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94	0.94						
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72	5.72						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	792	792						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	89.3	89.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	29	0

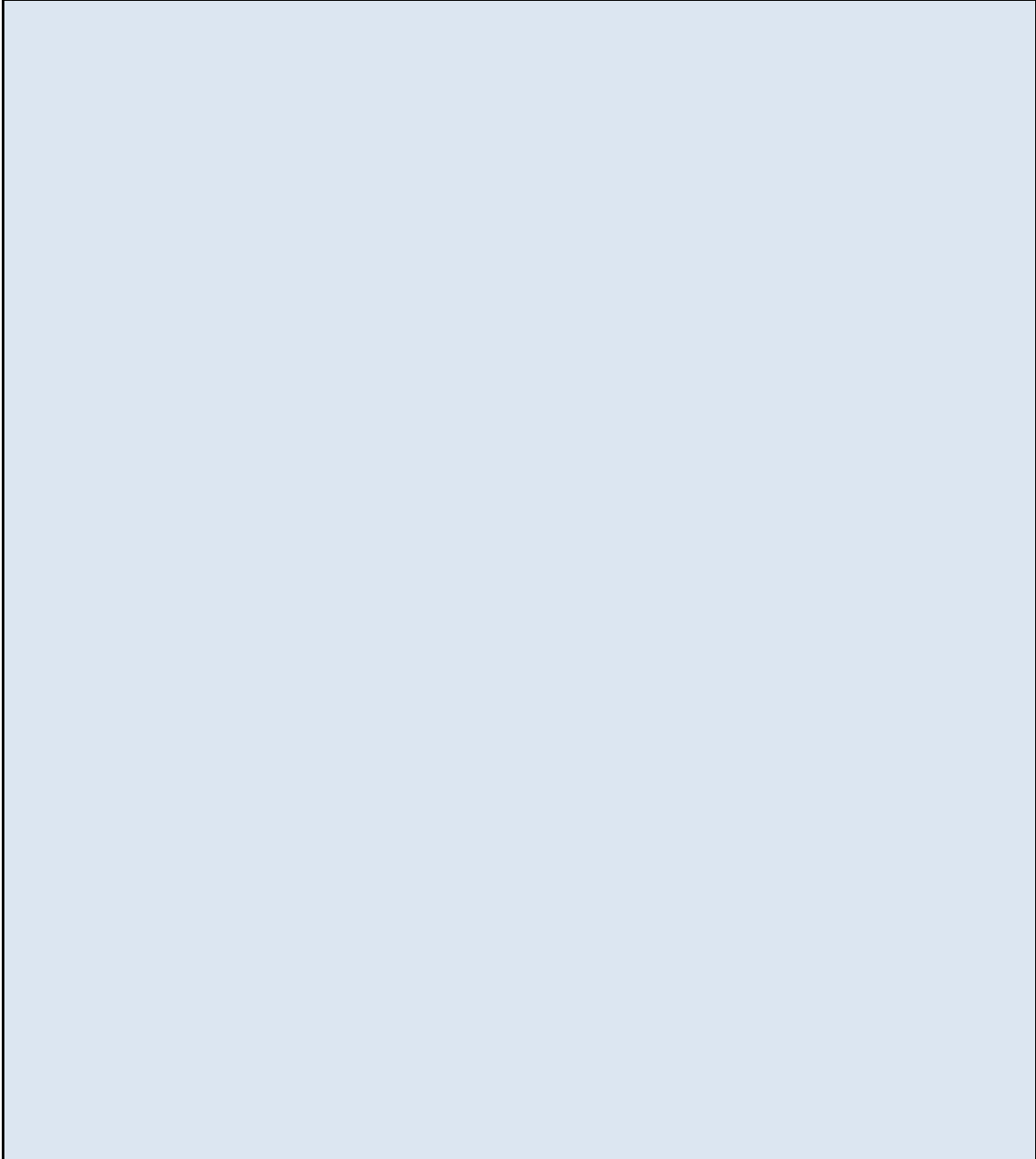
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,440	7,440
Oil Tank Working Rate	627	626
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0
Total	9,256	9,255

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **VOLKENS COLEMAN T4N-R64W-S23 L01**

Consent Decree Tank System Number: **465**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WADE T8N-R59W-S29 L01**

Consent Decree Tank System Number: **1674**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WADE T8N-R59W-S29 L01_FINAL PACKET	.pdf	8/10/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WADE T8N-R59W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	8/21/2017	STEM Engineering Evaluation Spreadsheet
WADE T8N-R59W-S29 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WADE T8N-R59W-S29 L01_FINAL PACKET	.pdf	8/10/2017	Work Request
WADE T8N-R59W-S29 L01_FINAL PACKET	.pdf	8/10/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WADE T8N-R59W-S29 L01_WALKDOWN	.pdf	8/10/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WADE T8N-R59W-S29 L01_IR VERIFICATION	.pdf	3/23/2018	IR Verification Field Data Sheet
WADE T8N-R59W-S29 L01_2260_NORMAL	.mp4	8/9/2017	IR Camera Video Normal Operations
WADE T8N-R59W-S29 L01_2261_DUMP	.mp4	8/9/2017	IR Camera Video During Dump Event
WADE T8N-R59W-S29 L01_2262_POST	.mp4	8/9/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WADE T8N-R59W-S29 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WADE T8N-R59W-S29 L01**

**Consent Decree Tank System Number:** **1674**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>155</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 1" (ro)</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>155</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; a*</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>53,002</b>	<b>52,175</b>	<b>-2%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>87,959</b>	<b>87,959</b>	
Total VCS Capacity (scfh)	<b>91,957</b>	<b>92,917</b>	
VCS Capacity minus PPIVF (scfh)	<b>38,955</b>	<b>40,742</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/14/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WADE T8N-R59W-S29 L01**

Consent Decree Tank System Number: **1674**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.60</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.71</b>							
Gas/Oil Ratio (scf/bbl)	<b>293.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>17.60</b>							
Critical Pressure (psia) <sup>b</sup>	<b>615</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>168</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>3090</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>908.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>29</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.75</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>93.30</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>30966</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>124</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>174</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>11</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>37,833</b>	<b>38,478</b>
Oil Tank Working Rate	<b>1,224</b>	<b>1,242</b>
Water Tank Flash Rate	<b>5,161</b>	<b>5,229</b>
Water Tank Working Rate	<b>7,244</b>	<b>7,340</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>52,175</b>	<b>53,002</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WADE T8N-R59W-S29 L01**

Consent Decree Tank System Number: **1674**

**Audit Notes**

The walkdown checklist (WADE T8N-R59W-S29 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (WADE T8N-R59W-S29 L01\_FINAL PACKET).

The separator pneumatic PSHH is set by the operator not automation and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 155 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAHLERT AC33 ECONODE T7N-R63W-S3 L01**

Consent Decree Tank System Number: **1992**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_FINAL PACKET	.pdf	10/12/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm		STEM Engineering Evaluation Spreadsheet
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_SIGNED EVAL	.pdf	7/17/2018	Final Signed Engineering Evaluation
245_WAHLERT AC33 ECONODE T7N-R63W-S3 L01_STEM Engineering Evaluation_rev1_with TLO_corrected	.xlsm	7/18/2018	STEM Engineering Evaluation Spreadsheet - Revised
245_WAHLERT AC33 ECONODE T7N-R63W-S3 L01_SIGNED EVAL_rev	.pdf	12/21/2018	Final Signed Engineering Evaluation - Revised

Modification Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_FINAL PACKET	.pdf	10/12/2015	Work Request
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_FINAL PACKET	.pdf	10/12/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_WALKDOWN	.pdf	10/12/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_IR VERIFICATION	.pdf	10/9/2015	IR Verification Field Data Sheet
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_0329_NORMAL	.mp4	10/8/2015	IR Camera Video Normal Operations
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_0330_DUMP	.mp4	10/8/2015	IR Camera Video During Dump Event
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_0331_POST	.mp4	10/8/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT AC33 ECONODE T7N-R63W-S3 L01_SIGNED EVAL	.pdf	7/17/2018	Final Signed Engineering Evaluation
245_WAHLERT AC33 ECONODE T7N-R63W-S3 L01_SIGNED EVAL_rev	.pdf	12/21/2018	Final Signed Engineering Evaluation - Revised

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WAHLERT AC33 ECONODE T7N-R63W-S3 L01

**Consent Decree Tank System Number:** 1992

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>10</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>4</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>4"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>6"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	LP 63HN	LP 64HN	LP 65 HN	LP 66 HN	LP 67HN	LP 68HN	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>		

<b>Water</b>	LP 63, 64 HN	LP 65, 66 HN	LP 67, 68 HN	HP 63, 64 HN	HP 65, 66 HN	HP 67, 68 HN	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>	<b>70</b>	<b>400</b>	<b>400</b>	<b>400</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>	<b>COMM 200 48"</b>	
Number of Units	<b>1</b>	<b>1</b>	<b>1</b>	
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>	<b>157</b>	

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>61,887</b>	<b>121,263</b>	<b>96%</b>
Calculated Burner Capacity (scfh)	<b>10,397</b>	<b>18,208</b>	
Headspace Surge Capacity (scfh)	<b>158,560</b>	<b>260,967</b>	
Total VCS Capacity (scfh)	<b>168,957</b>	<b>279,175</b>	
VCS Capacity minus PPIVF (scfh)	<b>107,070</b>	<b>157,913</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 8/29/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAHLERT AC33 ECONODE T7N-R63W-S3 L01**

Consent Decree Tank System Number: **1992**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77	0.77	0.77	0.77	0.77		
Z2	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86		
Z3	0.98	0.98	0.98	0.98	0.98	0.98		
Z	0.89	0.89	0.89	0.89	0.89	0.89		
Gas/Oil Ratio (scf/bbl)	112.8	112.8	112.8	112.8	112.8	112.8		

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77	0.77	0.77		
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25		
Critical Pressure (psia) <sup>b</sup>	539	539	539	539	539	539		
Vapor Pressure (psia) <sup>c</sup>	83	83	83	83	83	83		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85	0.85	0.85	0.85	0.85		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bopd) <sup>f,g</sup>	2409	2409	2409	2409	2409	2409		

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7	271.7	271.7	271.7	271.7		
Working Flow (Mscfd) <sup>h,i</sup>	23	23	23	23	23	23		

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77	0.77	0.77		
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	10135	10135	10135	22763	22763	22763		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	41	41	41	91	91	91		
Working Flow (Mscfd) <sup>l</sup>	57	57	57	128	128	128		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>i</sup>	396	396
Mscfd	95	38

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	67,923	33,962
Oil Tank Working Rate	5,727	2,857
Water Tank Flash Rate	16,449	8,224
Water Tank Working Rate	23,089	11,543
Tank Breathing Rate	5,547	2,774
Truck Loading Vapor	2,527	2,527
Total	121,263	61,887

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: WAHLERT AC33 ECONODE T7N-R63W-S3 L01

Consent Decree Tank System Number: 1992

**Audit Notes**

The Engineering Evaluation is completed with "doubled-up" entries for the LP oil, HP water, and LP water dump rates. The peak dump rates correspond to a single separator dump rate and not rate which is "doubled-up" as indicated on the Certification Report. Because the peak dump rates are underestimated, the Modeling Guideline has not been strictly applied.

The Engineering Evaluation did not include breathing losses from the non-production accepting tank bank. The facility configuration has two banks - one bank with five (5) oil tanks and two (2) water tanks, and another bank with five (5) oil tanks and two (2) water tanks. By excluding the breathing losses from the non-production accepting bank which continues to store oil, the correct application of the Modeling Guidelines cannot be verified.

A Rework Order request was issued to "bottom out" the NW-most oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. There is no Job Sheet associated with this rework request. On 12/21/2018 Noble confirmed the existence of a vapor headspace tank on location. This vapor headspace tank shares its vapor capacity with both banks of tanks on this location, confirming the tank banking configuration of one bank of 5 oil tanks, 2 water tanks, and a second bank of 4 oil tanks, 2 water tanks, and 1 shared vapor headspace tank.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAHLERT T7N-R63W-S23 L01**

Consent Decree Tank System Number: **2063**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WAHLERT T7N-R63W-S23 L01_FINAL PACKET	.pdf	7/18/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT T7N-R63W-S23 L01_STEM Engineering Evaluation_rev1	.xlsm	7/20/2017	STEM Engineering Evaluation Spreadsheet
WAHLERT T7N-R63W-S23 L01_SIGNED EVAL	.pdf	7/21/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT T7N-R63W-S23 L01_FINAL PACKET	.pdf	7/18/2017	Work Request
WAHLERT T7N-R63W-S23 L01_FINAL PACKET	.pdf	7/18/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT T7N-R63W-S23 L01_FINAL PACKET	.pdf	7/18/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT T7N-R63W-S23 L01_IR VERIFICATION	.pdf	7/18/2017	IR Verification Field Data Sheet
WAHLERT T7N-R63W-S23 L01_2134_NORMAL	.mp4	7/17/2017	IR Camera Video Normal Operations
WAHLERT T7N-R63W-S23 L01_2135_DUMP	.mp4	7/17/2017	IR Camera Video During Dump Event
WAHLERT T7N-R63W-S23 L01_2136_POST	.mp4	7/17/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WAHLERT T7N-R63W-S23 L01_SIGNED EVAL	.pdf	7/21/2017	Final Signed Engineering Evaluation



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WAHLERT T7N-R63W-S23 L01

**Consent Decree Tank System Number:** 2063

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	12
Oil Tank Capacity (bbl):	500
# of Water Tanks:	4
Water Tank Capacity (bbl):	500
VOC Line Size Tanks to KO (in):	3 "
# VOC Lines Tanks to KO:	2
VOC Line Size KO to Burner (in):	3 "
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	400	400	400	400				
Dump Valve Size & Trim Size (in)	2" & 1"	2" & 1"	2" & 1"	2" & 1"				

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	400	400	400	400	400	400	400	400
Dump Valve Size & Trim Size (in)	2" & 1"	2" & 1"	2" & 1"	2" & 1"	2" & 1"	2" & 1"	2" & 1"	2" & 1"

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED 48" Gen 1 #7			
Number of Units	3			
Man. Capacity (MSCFD)	140			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	80,092	80,120	0%
Calculated Burner Capacity (scfh)	7,650	17,500	
Headspace Surge Capacity (scfh)	1,711,967	1,711,967	
Total VCS Capacity (scfh)	1,719,617	1,729,467	
VCS Capacity minus PPIVF (scfh)	1,639,525	1,649,347	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 3/13/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 7/24/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAHLERT T7N-R63W-S23 L01**

Consent Decree Tank System Number: **2063**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02	-1.02				
Z2	-0.86	-0.86	-0.86	-0.86				
Z3	0.98	0.98	0.98	0.98				
Z	-0.90	-0.90	-0.90	-0.90				
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9	22.9				

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77				
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25				
Critical Pressure (psia) <sup>b</sup>	833	833	833	833				
Vapor Pressure (psia) <sup>c</sup>	407	407	407	407				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76	0.76	0.76				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bopd) <sup>f,g</sup>	6905	6905	6905	6905				

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	158.2	158.2	158.2	158.2				
Working Flow (Mscfd) <sup>h,i</sup>	66	66	66	66				

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25	21.25	21.25	21.25	21.25
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200	3200	3200
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1	1	1
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak Flow (bwpd) <sup>f,g</sup>	11381	11381	11381	11381	11381	11381	11381	11381

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	46	46	46	46	46	46	46	46
Working Flow (Mscfd) <sup>l</sup>	64	64	64	64	64	64	64	64

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	500	500
scfh vapor/tank <sup>i</sup>	396	396
Mscfd	114	38

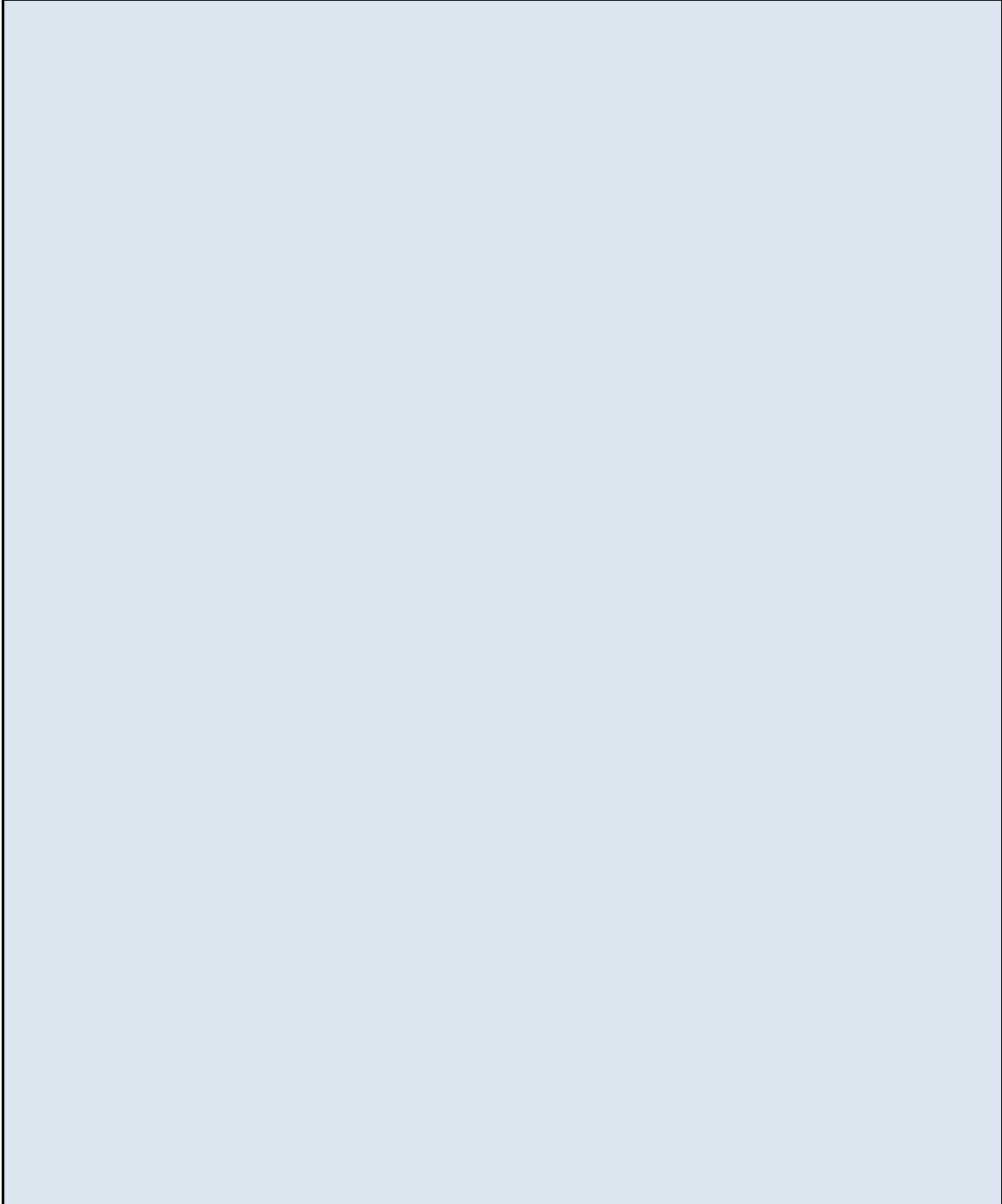
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	26,359	26,359
Oil Tank Working Rate	10,945	10,918
Water Tank Flash Rate	15,175	15,175
Water Tank Working Rate	21,301	21,300
Tank Breathing Rate	6,340	6,340
Truck Loading Vapor	0	0
Total	80,120	80,092

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAHLERT T7N-R63W-S23 L01**

Consent Decree Tank System Number: **2063**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R63W-S7 L01**

Consent Decree Tank System Number: **1975**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
097_WALCKER T7N-R63W-S7 L01 Facility Walkdown	.pdf	11/9/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S7 L01_STEM Engineering Evaluation_rev1	.xlsm	3/14/2017	STEM Engineering Evaluation Spreadsheet
WALCKER T7N-R63W-S7 L01_SIGNED EVAL	.pdf	3/15/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S7 L01_FINAL PACKET	.pdf	2/27/2017	Work Request
WALCKER T7N-R63W-S7 L01_FINAL PACKET	.pdf	2/27/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S7 L01_WALKDOWN	.pdf	2/27/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S7 L01_IR VERIFICATION	.pdf	2/23/2017	IR Verification Field Data Sheet
WALCKER T7N-R63W-S7 L01_0112_NORMAL	.mp4	2/21/2017	IR Camera Video Normal Operations
WALCKER T7N-R63W-S7 L01_0113_DUMP	.mp4	2/21/2017	IR Camera Video During Dump Event
WALCKER T7N-R63W-S7 L01_0114_POST	.mp4	2/21/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S7 L01_SIGNED EVAL	.pdf	3/15/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R63W-S7 L01**

Consent Decree Tank System Number: **1975**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>180</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>180</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>24,540</b>	<b>24,534</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,520</b>	<b>9,106</b>	
Headspace Surge Capacity (scfh)	<b>47,483</b>	<b>47,483</b>	
Total VCS Capacity (scfh)	<b>54,003</b>	<b>56,589</b>	
VCS Capacity minus PPIVF (scfh)	<b>29,463</b>	<b>32,055</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 8/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R63W-S7 L01**

Consent Decree Tank System Number: **1975**

Valko-McCain <sup>a</sup>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.74							
Z2	-0.86							
Z3	0.98							
Z	1.86							
Gas/Oil Ratio (scf/bbl)	362.2							

Peak Oil Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20							
Critical Pressure (psia) <sup>b</sup>	637							
Vapor Pressure (psia) <sup>c</sup>	193							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.81							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1438							

Oil Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	521.0							
Working Flow (Mscfd) <sup>h,i</sup>	14							

Peak Water Flow	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	0.78							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	7.20							
Critical Pressure (psia) <sup>j</sup>	3200							
Vapor Pressure (psia) <sup>k</sup>	1							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	0.96							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bwpd) <sup>f,g</sup>	2665							

Water Tank Flow Rates	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	11							
Working Flow (Mscfd) <sup>l</sup>	15							

Breathing Rates <sup>m</sup>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	23	6

Flow Rate Summary	Flow Rate (scfh)	
	SLR	Noble
Oil Tank Flash Rate	21,707	21,707
Oil Tank Working Rate	570	568
Water Tank Flash Rate	444	444
Water Tank Working Rate	624	632
Tank Breathing Rate	1,189	1,189
Truck Loading Vapor	0	0

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	24,534	24,540
-------	--------	--------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R63W-S7 L01**

Consent Decree Tank System Number: **1975**

**Audit Notes**

Final Packet (WALCKER T7N-R63W-S7 L01\_FINAL PACKET) is missing pages: front signature page, Field Datasheet Oil Tank, Separator, VRT pages.

NEI's Data Request Response:

Facility walkdown provided in this 3rd Information Request Response titled 097\_WALCKER T7N-R63W-S7 L01 Facility Walkdown.

Once the full field datasheet had been provided, it was determined that both the modeling guideline and the engineering design standard were adequately followed.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R63W-S17 L02**

Consent Decree Tank System Number: **1984**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S17 L02_FINAL PACKET	.pdf	3/1/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S17 L02_STEM Engineering Evaluation_rev1	.xlsm	3/20/2017	STEM Engineering Evaluation Spreadsheet
WALCKER T7N-R63W-S17 L02_SIGNED EVAL	.pdf	3/20/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S17 L02_FINAL PACKET	.pdf	3/1/2017	Work Request
WALCKER T7N-R63W-S17 L02_FINAL PACKET	.pdf	3/1/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S17 L02_WALKDOWN	.pdf	3/1/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S17 L02_IR VERIFICATION	.pdf	2/28/2017	IR Verification Field Data Sheet
WALCKER T7N-R63W-S17 L02_0119_NORMAL	.mp4	2/28/2017	IR Camera Video Normal Operations
WALCKER T7N-R63W-S17 L02_0120_DUMP	.mp4	2/28/2017	IR Camera Video During Dump Event
WALCKER T7N-R63W-S17 L02_0121_POST	.mp4	2/28/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R63W-S17 L02_SIGNED EVAL	.pdf	3/20/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R63W-S17 L02**

Consent Decree Tank System Number: **1984**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>180</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>180</b>	<b>180</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>1" &amp; 1/2"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>26,885</b>	<b>27,837</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,716</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>59,300</b>	<b>59,300</b>	
Total VCS Capacity (scfh)	<b>63,016</b>	<b>63,853</b>	
VCS Capacity minus PPIVF (scfh)	<b>36,131</b>	<b>36,016</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 11/20/2017  
 Audit Document Review Verified by: Chris Driscoll  
 Audit Document Verification Date: 4/3/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R63W-S17 L02**

Consent Decree Tank System Number: **1984**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.74</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.86</b>							
Gas/Oil Ratio (scf/bbl)	<b>362.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.78</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>637</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>193</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1438</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>521.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>14</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.77</b>	<b>0.94</b>						
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>21.25</b>	<b>5.72</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>7765</b>	<b>2552</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>31</b>	<b>10</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>44</b>	<b>14</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>21,707</b>	<b>20,783</b>
Oil Tank Working Rate	<b>570</b>	<b>544</b>
Water Tank Flash Rate	<b>1,719</b>	<b>1,719</b>
Water Tank Working Rate	<b>2,414</b>	<b>2,413</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>27,837</b>	<b>26,885</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R63W-S17 L02**

Consent Decree Tank System Number: **1984**

**Audit Notes**

The Walkdown Checklist (WALCKER T7N-R63W-S17 L02\_WALKDOWN.pdf, pg. 4) did not indicate if all items on the Work Request form had been completed. Completion of the Work Request was verified through other documentation in the Final Packet.

The Signed Eval (WALCKER T7N-R63W-S17 L02\_SIGNED EVAL.pdf, pg. 2) indicates a tank max fill of 72 %. Assuming that the tanks are all at 90 %, with one tank bottomed out for headspace as indicated, the max fill is incorrect  $[(5/6) * 90\% = 75\%]$ .

Per the Work Request (WALCKER T7N-R63W-S17 L02\_FINAL PACKET.pdf, pg. 3) the HP separator pressure to be modified to 180 psig max. Supplied data from the 11/30/2017 data request supports this.

Per the Field Datasheet (WALCKER T7N-R63W-S17 L02\_FINAL PACKET.pdf, pg. 13) the 300-bbl water tank connected to the VCS line is only supplied by the LP separator. However, the Signed Eval (WALCKER T7N-R63W-S17 L02\_SIGNED EVAL.pdf, pg 2) only indicates the HP and LP separator dump sizes to the water tank. The valve size was assumed to be 2" to be conservative. A 2" valve was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R64W-S12 L01**

Consent Decree Tank System Number: **1934**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L01_FINAL PACKET	.pdf	9/21/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
WALCKER T7N-R64W-S12 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L01_FINAL PACKET	.pdf	9/21/2015	Work Request
WALCKER T7N-R64W-S12 L01_FINAL PACKET	.pdf	9/21/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L01_WALKDOWN	.pdf	9/16/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L01_IR VERIFICATION	.pdf	9/16/2015	IR Verification Field Data Sheet
WALCKER T7N-R64W-S12 L01_0270_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WALCKER T7N-R64W-S12 L01_0271_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WALCKER T7N-R64W-S12 L01_0272_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L01_SIGNED EVAL	.pdf	6/28/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WALCKER T7N-R64W-S12 L01

**Consent Decree Tank System Number:** 1934

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>20,641</b>	<b>20,643</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>35,851</b>	<b>35,851</b>	
Total VCS Capacity (scfh)	<b>38,778</b>	<b>41,684</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,137</b>	<b>21,042</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/27/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R64W-S12 L01**

Consent Decree Tank System Number: **1934**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.72							
Z2	-0.86							
Z3	0.98							
Z	1.83							
Gas/Oil Ratio (scf/bbl)	348.0							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	633							
Vapor Pressure (psia) <sup>c</sup>	188							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.81							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1354							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	471.1							
Working Flow (Mscfd) <sup>h,i</sup>	13							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	19,631	19,631
Oil Tank Working Rate	536	535
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	20,643	20,641

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R64W-S12 L01**

Consent Decree Tank System Number: **1934**

**Audit Notes**

No Audit Notes



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R64W-S12 L02**

Consent Decree Tank System Number: **1900**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L02_FINAL PACKET	.pdf	9/21/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L02_STEM Engineering Evaluation_rev1	.xlsm	1/3/2018	STEM Engineering Evaluation Spreadsheet
WALCKER T7N-R64W-S12 L02_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L02_FINAL PACKET	.pdf	9/21/2015	Work Request
WALCKER T7N-R64W-S12 L02_FINAL PACKET	.pdf	9/21/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L02_WALKDOWN	.pdf	9/21/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L02_IR VERIFICATION	.pdf	9/18/2015	IR Verification Field Data Sheet
WALCKER T7N-R64W-S12 L02_0267_NORMAL	.mp4	9/16/2015	IR Camera Video Normal Operations
WALCKER T7N-R64W-S12 L02_0268_DUMP	.mp4	9/16/2015	IR Camera Video During Dump Event
WALCKER T7N-R64W-S12 L02_0269_POST	.mp4	9/16/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WALCKER T7N-R64W-S12 L02_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R64W-S12 L02**

Consent Decree Tank System Number: **1900**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>175</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>21,538</b>	<b>21,540</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,927</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>37,268</b>	<b>37,268</b>	
Total VCS Capacity (scfh)	<b>40,195</b>	<b>43,101</b>	
VCS Capacity minus PPIVF (scfh)	<b>18,657</b>	<b>21,561</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R64W-S12 L02**

Consent Decree Tank System Number: **1900**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.72</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.83</b>							
Gas/Oil Ratio (scf/bbl)	<b>348.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>633</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>188</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.81</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1414</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>492.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>13</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>20,504</b>	<b>20,504</b>
Oil Tank Working Rate	<b>560</b>	<b>559</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>21,540</b>	<b>21,538</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER T7N-R64W-S12 L02**

Consent Decree Tank System Number: **1900**

### Audit Notes

The stem work request form (PG 3 of Final Packet pdf) states for the pneumatic pshh to set the hp hi/lo no higher than 175 psig however nowhere in the job sheets (PGs 18-20) does it confirm this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 4), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 175 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER USX T7N-R64W-S1 L02**

Consent Decree Tank System Number: **1869**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WALCKER USX T7N-R64W-S1 L02_FINAL PACKET	.pdf	2/6/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WALCKER USX T7N-R64W-S1 L02_STEM Engineering Evaluation_rev1	.xlsm	2/15/2017	STEM Engineering Evaluation Spreadsheet
WALCKER USX T7N-R64W-S1 L02_SIGNED EVAL	.pdf	2/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WALCKER USX T7N-R64W-S1 L02_FINAL PACKET	.pdf	2/6/2017	Work Request
WALCKER USX T7N-R64W-S1 L02_FINAL PACKET	.pdf	2/6/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WALCKER USX T7N-R64W-S1 L02_WALKDOWN	.pdf	2/6/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WALCKER USX T7N-R64W-S1 L02_IR VERIFICATION	.pdf	2/3/2017	IR Verification Field Data Sheet
WALCKER USX T7N-R64W-S1 L02_0102_NORMAL	.mp4	2/1/2017	IR Camera Video Normal Operations
WALCKER USX T7N-R64W-S1 L02_0103_DUMP	.mp4	2/1/2017	IR Camera Video During Dump Event
WALCKER USX T7N-R64W-S1 L02_0104_POST	.mp4	2/1/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WALCKER USX T7N-R64W-S1 L02_SIGNED EVAL	.pdf	2/16/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER USX T7N-R64W-S1 L02**

Consent Decree Tank System Number: **1869**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,320</b>	<b>4,321</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,331</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>5,002</b>	<b>5,002</b>	
Total VCS Capacity (scfh)	<b>7,333</b>	<b>10,835</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,013</b>	<b>6,514</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/18/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/19/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER USX T7N-R64W-S1 L02**

Consent Decree Tank System Number: **1869**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,321</b>	<b>4,320</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WALCKER USX T7N-R64W-S1 L02**

Consent Decree Tank System Number: **1869**

**Audit Notes**

The final walkdown checklist is not marked as being complete.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WARDLAW T6N-R64W-S28 L01**

Consent Decree Tank System Number: **2093**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S28 L01_FINAL PACKET	.pdf	1/14/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S28 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
WARDLAW T6N-R64W-S28 L01_SIGNED EVAL	.pdf	7/14/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S28 L01_FINAL PACKET	.pdf	1/14/2016	Work Request
WARDLAW T6N-R64W-S28 L01_FINAL PACKET	.pdf	1/14/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S28 L01_WALKDOWN	.pdf	1/14/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S28 L01_IR VERIFICATION	.pdf	1/14/2016	IR Verification Field Data Sheet
WARDLAW T6N-R64W-S28 L01_0023_NORMAL	.mp4	1/13/2016	IR Camera Video Normal Operations
WARDLAW T6N-R64W-S28 L01_0024_DUMP	.mp4	1/13/2016	IR Camera Video During Dump Event
WARDLAW T6N-R64W-S28 L01_0025_POST	.mp4	1/13/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S28 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WARDLAW T6N-R64W-S28 L01**

Consent Decree Tank System Number: **2093**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>69</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,183</b>	<b>4,184</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,878</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>881</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,759</b>	<b>4,553</b>	
VCS Capacity minus PPIVF (scfh)	<b>576</b>	<b>369</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 5/18/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/9/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WARDLAW T6N-R64W-S28 L01**

Consent Decree Tank System Number: **2093**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.76</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.87</b>							
Gas/Oil Ratio (scf/bbl)	<b>111.1</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>538</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>82</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>785</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>87.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,635</b>	<b>3,635</b>
Oil Tank Working Rate	<b>311</b>	<b>310</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,184</b>	<b>4,183</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WARDLAW T6N-R64W-S28 L01**

Consent Decree Tank System Number: **2093**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WARDLAW T6N-R64W-S35 L01**

Consent Decree Tank System Number: **281/1382**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_FINAL PACKET	.pdf	5/19/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_STEM Engineering Evaluation_rev1	.xlsm	5/22/2017	STEM Engineering Evaluation Spreadsheet
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_FINAL PACKET	.pdf	5/19/2017	Work Request
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_FINAL PACKET	.pdf	5/19/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_WALKDOWN	.pdf	5/19/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_IR VERIFICATION	.pdf	5/18/2017	IR Verification Field Data Sheet
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_2049_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_2050_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_2051_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01_SIGNED EVAL	.pdf	5/26/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WARDLAW T6N-R64W-S35 L01**

Consent Decree Tank System Number: **281/1382**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,195</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,666</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>426</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,092</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,024</b>	<b>1,764</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/8/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 11/8/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WARDLAW T6N-R64W-S35 L01**

Consent Decree Tank System Number: **281/1382**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_r$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>725</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>64.1</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_r$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_r$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,670</b>	<b>2,556</b>
Oil Tank Working Rate	<b>287</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,195</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WARDLAW T6N-R64W-S35 L01**

Consent Decree Tank System Number: **281/1382**

**Audit Notes**

The walkdown checklist (WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01\_FINAL PACKET).

The STEM work request document (WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01\_FINAL PACKET, p 5) requests that the existing 270# HP separator be replaced with a new or B-Grade HLP separator. The job sheet (WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01\_FINAL PACKET, p 32) confirms the 270# separator was swapped for a HLP separator. A1 from the walkdown checklist (WARDLAW T6N-R64W-S35 L01 & SHARKEY T6N-R64W-S35 L01\_WALKDOWN, p 1) confirms the trim size is 1/2". There is no confirmation of the new valve size, therefore the model was run with a 2" valve to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

This site was selected for an additional IR Camera inspection because the original videos were shot on a cloudy day, making it difficult to visually inspect for leaks.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WASHBURN T8N-R61W-S22 L01**

Consent Decree Tank System Number: **1982**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WASHBURN T8N-R61W-S22 L01_FINAL PACKET	.pdf	7/26/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WASHBURN T8N-R61W-S22 L01_STEM Engineering Evaluation_rev1	.xlsm	8/22/2017	STEM Engineering Evaluation Spreadsheet
WASHBURN T8N-R61W-S22 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WASHBURN T8N-R61W-S22 L01_FINAL PACKET	.pdf	7/26/2017	Work Request
WASHBURN T8N-R61W-S22 L01_FINAL PACKET	.pdf	7/26/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WASHBURN T8N-R61W-S22 L01_WALKDOWN	.pdf	7/26/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WASHBURN T8N-R61W-S22 L01_IR VERIFICATION	.pdf	7/25/2017	IR Verification Field Data Sheet
WASHBURN T8N-R61W-S22 L01_2157_NORMAL	.mp4	7/24/2017	IR Camera Video Normal Operations
WASHBURN T8N-R61W-S22 L01_2158_DUMP	.mp4	7/24/2017	IR Camera Video During Dump Event
WASHBURN T8N-R61W-S22 L01_2159_POST	.mp4	7/24/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WASHBURN T8N-R61W-S22 L01_SIGNED EVAL	.pdf	8/22/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WASHBURN T8N-R61W-S22 L01**

**Consent Decree Tank System Number:** **1982**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>500</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>500</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>185</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>185</b>							
Dump Valve Size & Trim Size (in)	<b>3" &amp; 3"</b>							

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>71,092</b>	<b>85,409</b>	<b>20%</b>
Calculated Burner Capacity (scfh)	<b>6,882</b>	<b>9,511</b>	
Headspace Surge Capacity (scfh)	<b>150,111</b>	<b>150,111</b>	
Total VCS Capacity (scfh)	<b>156,993</b>	<b>159,622</b>	
VCS Capacity minus PPIVF (scfh)	<b>85,901</b>	<b>74,213</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 7/9/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/15/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WASHBURN T8N-R61W-S22 L01**

Consent Decree Tank System Number: **1982**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.88</b>							
Gas/Oil Ratio (scf/bbl)	<b>376.7</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>642</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>198</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.80</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>4260</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>1604.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>41</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.76</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>107.00</b>							
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>							
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.96</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bwpd) <sup>f,g</sup>	<b>39093</b>							

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>156</b>							
Working Flow (Mscfd) <sup>l</sup>	<b>219</b>							

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>500</b>	<b>500</b>
scfh vapor/tank <sup>i</sup>	<b>396</b>	<b>396</b>
Mscfd	<b>19</b>	<b>10</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>66,871</b>	<b>54,866</b>
Oil Tank Working Rate	<b>1,688</b>	<b>1,382</b>
Water Tank Flash Rate	<b>6,515</b>	<b>5,681</b>
Water Tank Working Rate	<b>9,145</b>	<b>7,974</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>85,409</b>	<b>71,092</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WASHBURN T8N-R61W-S22 L01**

Consent Decree Tank System Number: **1982**

**Audit Notes**

The work request (FINAL PACKET p. 3) states that the PSHH needs to be set to 185 psig. There is no verification that this work was completed (FINAL PACKET p.4-29)

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 7), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 185 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WASTE MGMT T3N-R64W-S35 L01**

Consent Decree Tank System Number: **1406**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WASTE MGMT T3N-R64W-S35 L01_FINAL PACKET	.pdf	8/21/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WASTE MGMT T3N-R64W-S35 L01_STEM Engineering Evaluation_rev1	.xlsm	9/11/2017	STEM Engineering Evaluation Spreadsheet
WASTE MGMT T3N-R64W-S35 L01_SIGNED EVAL	.pdf	9/18/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WASTE MGMT T3N-R64W-S35 L01_FINAL PACKET	.pdf	8/21/2017	Work Request
WASTE MGMT T3N-R64W-S35 L01_FINAL PACKET	.pdf	8/21/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WASTE MGMT T3N-R64W-S35 L01_WALKDOWN	.pdf	8/21/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WASTE MGMT T3N-R64W-S35 L01_IR VERIFICATION	.pdf	3/23/2018	IR Verification Field Data Sheet
WASTE MGMT T3N-R64W-S35 L01_2301_NORMAL	.pdf	8/17/2017	IR Camera Video Normal Operations
WASTE MGMT T3N-R64W-S35 L01_2304_DUMP	.mp4	8/17/2017	IR Camera Video During Dump Event
WASTE MGMT T3N-R64W-S35 L01_2305_POST	.mp4	8/17/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WASTE MGMT T3N-R64W-S35 L01_SIGNED EVAL	.pdf	9/18/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WASTE MGMT T3N-R64W-S35 L01**

**Consent Decree Tank System Number:** **1406**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>171</b>	<b>171</b>	
Total VCS Capacity (scfh)	<b>4,198</b>	<b>5,129</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,130</b>	<b>2,060</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 6/18/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 6/19/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WASTE MGMT T3N-R64W-S35 L01**

Consent Decree Tank System Number: **1406**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WASTE MGMT T3N-R64W-S35 L01**

Consent Decree Tank System Number: **1406**

**Audit Notes**

The final walkdown checklist is not marked as being complete.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS BARNETT T4N-R64W-S12 L01**

Consent Decree Tank System Number: **446**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WATKINS BARNETT T4N-R64W-S12 L01_FINAL PACKET	.pdf	5/26/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WATKINS BARNETT T4N-R64W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	5/27/2016	STEM Engineering Evaluation Spreadsheet
WATKINS BARNETT T4N-R64W-S12 L01_SIGNED EVAL	.pdf	5/31/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WATKINS BARNETT T4N-R64W-S12 L01_FINAL PACKET	.pdf	5/26/2016	Work Request
WATKINS BARNETT T4N-R64W-S12 L01_FINAL PACKET	.pdf	5/26/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WATKINS BARNETT T4N-R64W-S12 L01_WALKDOWN	.pdf	5/26/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WATKINS BARNETT T4N-R64W-S12 L01_IR VERIFICATION	.pdf	5/25/2016	IR Verification Field Data Sheet
WATKINS BARNETT T4N-R64W-S12 L01_0948_NORMAL	.mp4	5/25/2016	IR Camera Video Normal Operations
WATKINS BARNETT T4N-R64W-S12 L01_0949_DUMP	.mp4	5/25/2016	IR Camera Video During Dump Event
WATKINS BARNETT T4N-R64W-S12 L01_0950_POST	.mp4	5/25/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WATKINS BARNETT T4N-R64W-S12 L01_SIGNED EVAL	.pdf	5/31/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WATKINS BARNETT T4N-R64W-S12 L01  
**Consent Decree Tank System Number:** 446

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,747</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>14,168</b>	<b>22,393</b>	
Total VCS Capacity (scfh)	<b>18,349</b>	<b>26,993</b>	
VCS Capacity minus PPIVF (scfh)	<b>13,841</b>	<b>22,246</b>	

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 6/20/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 11/8/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS BARNETT T4N-R64W-S12 L01**

Consent Decree Tank System Number: **446**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>17</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WATKINS BARNETT T4N-R64W-S12 L01

**Consent Decree Tank System Number:** 446

**Audit Notes**

The walkdown checklist (WATKINS BARNETT T4N-R64W-S12 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (WATKINS BARNETT T4N-R64W-S12 L01\_FINAL PACKET)

The Signed Evaluation (WATKINS BARNETT T4N-R64W-S12 L01\_SIGNED EVAL) includes 3 (300 bbl) tanks on the site, with 1 of them to be used just for headspace. However, the model (WATKINS BARNETT T4N-R64W-S12 L01\_STEM Engineering Evaluation\_rev1) was run using only 2 tanks and a 60% fill capacity. This error results in underestimation of breathing losses and headspace surge capacity. The modeling guideline in this case was not strictly followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WATKINS SATER T4N-R63W-S18 L01

**Consent Decree Tank System Number:** 462

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L01_FINAL PACKET	.pdf	1/25/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	1/31/2017	STEM Engineering Evaluation Spreadsheet
WATKINS SATER T4N-R63W-S18 L01_Final Signed STEM Plan	.pdf	2/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L01_FINAL PACKET	.pdf	1/25/2017	Work Request
WATKINS SATER T4N-R63W-S18 L01_FINAL PACKET	.pdf	1/25/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L01_WALKDOWN	.pdf	1/25/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L01_IR VERIFICATION	.pdf	1/24/2017	IR Verification Field Data Sheet
WATKINS SATER T4N-R63W-S18 L01_1267_NORMAL	.mp4	1/18/2017	IR Camera Video Normal Operations
WATKINS SATER T4N-R63W-S18 L01_1268_DUMP	.mp4	1/18/2017	IR Camera Video During Dump Event
WATKINS SATER T4N-R63W-S18 L01_1269_POST	.mp4	1/18/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L01_SIGNED EVAL	.pdf	1/31/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WATKINS SATER T4N-R63W-S18 L01**

**Consent Decree Tank System Number:** **462**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,582</b>	<b>13,584</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>29,756</b>	<b>29,756</b>	
Total VCS Capacity (scfh)	<b>33,845</b>	<b>34,356</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,263</b>	<b>20,772</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess

Audit Document Review Date: 2/20/2018

Audit Document Review Verified by: Craig Bock

Audit Document Verification Date: 12/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER T4N-R63W-S18 L01**

Consent Decree Tank System Number: **462**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.50</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.61</b>							
Gas/Oil Ratio (scf/bbl)	<b>256.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>601</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>153</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1184</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>303.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>11</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>12,639</b>	<b>12,639</b>
Oil Tank Working Rate	<b>469</b>	<b>468</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>13,584</b>	<b>13,582</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER T4N-R63W-S18 L01**

Consent Decree Tank System Number: **462**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

CB - Vapor headspace tank: There is no confirmation in the field data that one tank was bottomed out and disconnected from the fill header to be used as a headspace tank.

CB - Separator Pressure: There is no confirmation in the field data that the HP separator PSHH was set to 140 psig. This pressure was specified in the Work Request Form and used in the Signed Evaluation.

Noble Response:

Field verification for this facility was completed on or around 9/15/2016, field verification confirmed that one tank was converted to a headspace tank.

Noble has provided the following response regarding the pneumatic PSHH setting on the HP separator:

"The separator pneumatic PSHH is set by the operator, not automation, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 140 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation."



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WATKINS SATER T4N-R63W-S18 L03**

**Consent Decree Tank System Number:** **812**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L03_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L03_STEM Engineering Evaluation_rev1	.xls	7/11/2018	STEM Engineering Evaluation Spreadsheet
WATKINS SATER T4N-R63W-S18 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L03_FINAL PACKET	.pdf	7/11/2018	Work Request
WATKINS SATER T4N-R63W-S18 L03_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L03_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L03_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
WATKINS SATER T4N-R63W-S18 L03_1328_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WATKINS SATER T4N-R63W-S18 L03_1330_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WATKINS SATER T4N-R63W-S18 L03_1331_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R63W-S18 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER T4N-R63W-S18 L03**

Consent Decree Tank System Number: **812**

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>115</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED EC48-2S</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>119</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,223</b>	<b>5,223</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>6,698</b>	<b>10,792</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,475</b>	<b>5,568</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER T4N-R63W-S18 L03**

Consent Decree Tank System Number: **812**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.30</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.41</b>							
Gas/Oil Ratio (scf/bbl)	<b>198.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.91</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>579</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>128</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>574</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>114.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>5</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>4,758</b>	<b>4,758</b>
Oil Tank Working Rate	<b>227</b>	<b>227</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,223</b>	<b>5,223</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER T4N-R63W-S18 L03**

Consent Decree Tank System Number: **812**

**Audit Notes**

The stem work request form (PG 3 of Final Packet pdf) states for the pneumatic pshh to set the hp hi/lo no higher than 115 psig however nowhere in the job sheets (PGs 18-22) does it confirm this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 5), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 115 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

The stem work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 18-22 of the Final Packet) does it confirm this task was completed

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 10/17/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER T4N-R64W-S12 L01**

Consent Decree Tank System Number: **449**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R64W-S12 L01_FINAL PACKET	.pdf	5/22/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R64W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	8/1/2016	STEM Engineering Evaluation Spreadsheet
WATKINS SATER T4N-R64W-S12 L01_SIGNED EVAL	.pdf	8/4/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R64W-S12 L01_FINAL PACKET	.pdf	5/22/2018	Work Request
WATKINS SATER T4N-R64W-S12 L01_FINAL PACKET	.pdf	5/22/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R64W-S12 L01_WALKDOWN	.pdf	2/21/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R64W-S12 L01_IR VERIFICATION	.pdf	7/22/2016	IR Verification Field Data Sheet
WATKINS SATER T4N-R64W-S12 L01_1321_NORMAL	.mp4	7/21/2016	IR Camera Video Normal Operations
WATKINS SATER T4N-R64W-S12 L01_1322_DUMP	.mp4	7/21/2016	IR Camera Video During Dump Event
WATKINS SATER T4N-R64W-S12 L01_1323_POST	.mp4	7/21/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WATKINS SATER T4N-R64W-S12 L01_SIGNED EVAL	.pdf	8/4/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WATKINS SATER T4N-R64W-S12 L01  
**Consent Decree Tank System Number:** 449

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,662</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>18,907</b>	<b>18,907</b>	
Total VCS Capacity (scfh)	<b>21,569</b>	<b>24,740</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,061</b>	<b>20,231</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwein  
 Audit Document Review Date: 7/17/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER T4N-R64W-S12 L01**

Consent Decree Tank System Number: **449**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>l</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER T4N-R64W-S12 L01**

Consent Decree Tank System Number: **449**

**Audit Notes**

A Work Order request was issued to "bottom out" one oil tank; remove the oil fill line from the tank while keeping the tank connected to the VCS in order to be utilized as head space only. The accompanying Job Sheet did not confirm the tank was "bottomed out" and the Walkdown Checklist was not checked as complete to "Confirm all the items on the work request form have been completed." Additionally, the provided STEM Retrofit Walkdown Checklist, Item C13, was checked "yes" indicating all tank fill lines are configured to enable LP separators to produce into all tanks.

Noble provided information on 12/10/2018 indicating a "Field verification for this facility was completed on or around 6/27/2016, field verification confirmed that one tank was converted to a headspace tank." The Engineering Design Standard has been appropriately applied based on the provided field verification information.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER UPV T4N-R64W-S14 L01**

Consent Decree Tank System Number: **469**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WATKINS SATER UPV T4N-R64W-S14 L01_FINAL PACKET	.pdf	12/7/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS SATER UPV T4N-R64W-S14 L01_STEM Engineering Evaluation_rev1	.xlsm	1/5/2018	STEM Engineering Evaluation Spreadsheet
WATKINS SATER UPV T4N-R64W-S14 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS SATER UPV T4N-R64W-S14 L01_FINAL PACKET	.pdf	12/7/2016	Work Request
WATKINS SATER UPV T4N-R64W-S14 L01_FINAL PACKET	.pdf	12/7/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS SATER UPV T4N-R64W-S14 L01_WALKDOWN	.pdf	12/7/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS SATER UPV T4N-R64W-S14 L01_IR VERIFICATION	.pdf	12/5/2016	IR Verification Field Data Sheet
WATKINS SATER UPV T4N-R64W-S14 L01_1778_NORMAL	.mp4	12/5/2016	IR Camera Video Normal Operations
WATKINS SATER UPV T4N-R64W-S14 L01_1779_DUMP	.mp4	12/5/2016	IR Camera Video During Dump Event
WATKINS SATER UPV T4N-R64W-S14 L01_1780_POST	.mp4	12/5/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS SATER UPV T4N-R64W-S14 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WATKINS SATER UPV T4N-R64W-S14 L01**

**Consent Decree Tank System Number:** **469**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,845</b>	<b>3,845</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,953</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>500</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,453</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>608</b>	<b>1,113</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwein  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/30/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER UPV T4N-R64W-S14 L01**

Consent Decree Tank System Number: **469**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.69</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.81</b>							
Gas/Oil Ratio (scf/bbl)	<b>104.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>535</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>78</b>							
Critical pressure ratio ( $F_T$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>760</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>79.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_T$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,307</b>	<b>3,307</b>
Oil Tank Working Rate	<b>301</b>	<b>300</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,845</b>	<b>3,845</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS SATER UPV T4N-R64W-S14 L01**

Consent Decree Tank System Number: **469**

**Audit Notes**

The single oil tank fill level was certified to 90% with equalizer height as the control method. A single tank is unable to limit fill level via equalizer height and must utilize other means (level switch with production shutdown, etc.) for tank level control. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS T4N-R63W-S18 L03**

Consent Decree Tank System Number: **941**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WATKINS T4N-R63W-S18 L03_FINAL PACKET	.pdf	2/9/2017	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS T4N-R63W-S18 L03_STEM Engineering Evaluation_rev1	.xlsm	3/6/2017	STEM Engineering Evaluation Spreadsheet
WATKINS T4N-R63W-S18 L03_Final Signed STEM Plan	.pdf	3/30/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS T4N-R63W-S18 L03_FINAL PACKET	.pdf	2/9/2017	Work Request
WATKINS T4N-R63W-S18 L03_FINAL PACKET	.pdf	2/9/2017	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS T4N-R63W-S18 L03_WALKDOWN	.pdf	2/9/2017	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS T4N-R63W-S18 L03_IR VERIFICATION	.pdf	2/8/2017	IR Verification Field Data Sheet
WATKINS T4N-R63W-S18 L03_1322_NORMAL	.mp4	2/3/2017	IR Camera Video Normal Operations
WATKINS T4N-R63W-S18 L03_1323_DUMP	.mp4	2/3/2017	IR Camera Video During Dump Event
WATKINS T4N-R63W-S18 L03_1324_POST	.mp4	2/3/2017	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WATKINS T4N-R63W-S18 L03_SIGNED EVAL	.pdf	3/7/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS T4N-R63W-S18 L03**

Consent Decree Tank System Number: **941**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>115</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>119</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,223</b>	<b>5,223</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,735</b>	<b>9,558</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>7,735</b>	<b>9,558</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,512</b>	<b>4,335</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 12/13/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS T4N-R63W-S18 L03**

Consent Decree Tank System Number: **941**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.30</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.41</b>							
Gas/Oil Ratio (scf/bbl)	<b>198.9</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.91</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>579</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>128</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.83</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>574</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>114.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>5</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>6</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>4,758</b>	<b>4,758</b>
Oil Tank Working Rate	<b>227</b>	<b>227</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>5,223</b>	<b>5,223</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WATKINS T4N-R63W-S18 L03**

Consent Decree Tank System Number: **941**

**Audit Notes**

The walkdown checklist is not marked complete

The STEM work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot, however, nowhere in the Job Sheets (PGs 19-23 of the Final Packet) does it confirm this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 9/21/2016, field verification confirmed that the 3" VOC line from the tank to the KO pot was installed."



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAUGH PC T7N-R64W-S8 L01**

Consent Decree Tank System Number: **1877**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WAUGH PC T7N-R64W-S8 L01_FINAL PACKET	.pdf	1/19/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WAUGH PC T7N-R64W-S8 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
WAUGH PC T7N-R64W-S8 L01_Final Signed STEM Plan	.pdf	8/22/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WAUGH PC T7N-R64W-S8 L01_FINAL PACKET	.pdf	1/19/2016	Work Request
WAUGH PC T7N-R64W-S8 L01_FINAL PACKET	.pdf	1/19/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WAUGH PC T7N-R64W-S8 L01_WALKDOWN	.pdf	1/19/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WAUGH PC T7N-R64W-S8 L01_IR VERIFICATION	.pdf	1/19/2016	IR Verification Field Data Sheet
WAUGH PC T7N-R64W-S8 L01_0602_NORMAL	.mp4	1/18/2016	IR Camera Video Normal Operations
WAUGH PC T7N-R64W-S8 L01_0603_DUMP	.mp4	1/18/2016	IR Camera Video During Dump Event
WAUGH PC T7N-R64W-S8 L01_0604_POST	.mp4	1/18/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WAUGH PC T7N-R64W-S8 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAUGH PC T7N-R64W-S8 L01**

Consent Decree Tank System Number: **1877**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>55</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,068</b>	<b>3,069</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,813</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>2,813</b>	<b>5,833</b>	
VCS Capacity minus PPIVF (scfh)	<b>-255</b>	<b>2,764</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Chris Boggess  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAUGH PC T7N-R64W-S8 L01**

Consent Decree Tank System Number: **1877**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.51</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.62</b>							
Gas/Oil Ratio (scf/bbl)	<b>88.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>526</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>68</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>694</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>61.4</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>2,556</b>	<b>2,556</b>
Oil Tank Working Rate	<b>275</b>	<b>274</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,069</b>	<b>3,068</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WAUGH PC T7N-R64W-S8 L01**

Consent Decree Tank System Number: **1877**

**Audit Notes**

The walkdown checklist is not marked complete

CB - The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

SLR Evaluation shows the VCS capacity to be adequate.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WEBSTER T5N-R64W-S6 L01**

Consent Decree Tank System Number: **1482**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WEBSTER T5N-R64W-S6 L01_FINAL PACKET	.pdf	3/27/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WEBSTER T5N-R64W-S6 L01_STEM Engineering Evaluation_rev1	.xlsm	10/10/2016	STEM Engineering Evaluation Spreadsheet
WEBSTER T5N-R64W-S6 L01_SIGNED EVAL	.pdf	10/11/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WEBSTER T5N-R64W-S6 L01_FINAL PACKET	.pdf	3/27/2018	Work Request
WEBSTER T5N-R64W-S6 L01_FINAL PACKET	.pdf	3/27/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WEBSTER T5N-R64W-S6 L01_WALKDOWN	.pdf	10/10/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WEBSTER T5N-R64W-S6 L01_IR VERIFICATION	.pdf	10/6/2016	IR Verification Field Data Sheet
WEBSTER T5N-R64W-S6 L01_1578_NORMAL	.mp4	10/5/2016	IR Camera Video Normal Operations
WEBSTER T5N-R64W-S6 L01_1579_DUMP	.mp4	10/5/2016	IR Camera Video During Dump Event
WEBSTER T5N-R64W-S6 L01_1580_POST	.mp4	10/5/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WEBSTER T5N-R64W-S6 L01_SIGNED EVAL	.pdf	10/11/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WEBSTER T5N-R64W-S6 L01**

**Consent Decree Tank System Number:** **1482**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,689</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>2,725</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>18,508</b>	<b>19,428</b>	
Total VCS Capacity (scfh)	<b>21,233</b>	<b>25,261</b>	
VCS Capacity minus PPIVF (scfh)	<b>16,725</b>	<b>20,573</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker

Audit Document Review Date: 5/21/2018

Audit Document Review Verified by: James Van Horne

Audit Document Verification Date: 11/8/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WEBSTER T5N-R64W-S6 L01**

Consent Decree Tank System Number: **1482**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>827</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>93.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,885</b>	<b>3,720</b>
Oil Tank Working Rate	<b>328</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>4,689</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WEBSTER T5N-R64W-S6 L01**

Consent Decree Tank System Number: **1482**

**Audit Notes**

The walkdown checklist (WEBSTER T5N-R64W-S6 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (WEBSTER T5N-R64W-S6 L01\_FINAL PACKET).

The STEM work request (WEBSTER T5N-R64W-S6 L01\_FINAL PACKET, p 3) requested a new D-Grade LP separator to be installed , and to reduce the new LP dump valve to 1/2" trim. The new separator was confirmed to be installed on the Job Sheet (WEBSTER T5N-R64W-S6 L01\_FINAL PACKET, p 23) and the valve trim was confirmed to be 1/2" on item A1 of the walkdown checklist. There is no confirmation of the new valve size. A 2" valve, the largest valve with a 1/2" trim, was used to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELCH T7N-R63W-S21 L01**

Consent Decree Tank System Number: **1584**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELCH T7N-R63W-S21 L01_FINAL PACKET	.pdf	3/23/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELCH T7N-R63W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	3/24/2017	STEM Engineering Evaluation Spreadsheet
WELCH T7N-R63W-S21 L01_SIGNED EVAL	.pdf	3/30/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELCH T7N-R63W-S21 L01_FINAL PACKET	.pdf	3/23/2017	Work Request
WELCH T7N-R63W-S21 L01_FINAL PACKET	.pdf	3/23/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELCH T7N-R63W-S21 L01_WALKDOWN	.pdf	3/20/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELCH T7N-R63W-S21 L01_IR VERIFICATION	.pdf	3/20/2017	IR Verification Field Data Sheet
WELCH T7N-R63W-S21 L01_1877_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WELCH T7N-R63W-S21 L01_1878_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WELCH T7N-R63W-S21 L01_1879_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELCH T7N-R63W-S21 L01_SIGNED EVAL	.pdf	3/30/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELCH T7N-R63W-S21 L01**

Consent Decree Tank System Number: **1584**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,769</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>0</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>3,769</b>	<b>4,600</b>	
VCS Capacity minus PPIVF (scfh)	<b>325</b>	<b>1,013</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELCH T7N-R63W-S21 L01**

Consent Decree Tank System Number: **1584**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	759							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	73.2							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,049	2,919
Oil Tank Working Rate	301	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELCH T7N-R63W-S21 L01**

Consent Decree Tank System Number: **1584**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 21) indicates a new LP separator was installed onsite and ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 27) is checked "yes" indicating the oil dump trim is consistent with the Engineering Evaluation, and is therefore 1/2". There is no indication of the oil dump valve size installed in the separator onsite.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HP separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Single Tank Battery**

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELD COUNTY T5N-R65W-S1 L01**

Consent Decree Tank System Number: **999**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WELD COUNTY T5N-R65W-S1 L01_FINAL PACKET	.pdf	5/22/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WELD COUNTY T5N-R65W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	1/5/2018	STEM Engineering Evaluation Spreadsheet
WELD COUNTY T5N-R65W-S1 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WELD COUNTY T5N-R65W-S1 L01_FINAL PACKET	.pdf	5/22/2018	Work Request
WELD COUNTY T5N-R65W-S1 L01_FINAL PACKET	.pdf	5/22/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WELD COUNTY T5N-R65W-S1 L01_WALKDOWN	.pdf	10/10/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WELD COUNTY T5N-R65W-S1 L01_IR VERIFICATION	.pdf	10/5/2016	IR Verification Field Data Sheet
WELD COUNTY T5N-R65W-S1 L01_1569_NORMAL	.mp4	10/3/2016	IR Camera Video Normal Operations
WELD COUNTY T5N-R65W-S1 L01_1570_DUMP	.mp4	10/3/2016	IR Camera Video During Dump Event
WELD COUNTY T5N-R65W-S1 L01_1571_POST	.mp4	10/3/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WELD COUNTY T5N-R65W-S1 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELD COUNTY T5N-R65W-S1 L01**

**Consent Decree Tank System Number:** **999**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,587</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,027</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>422</b>	<b>0</b>	
Total VCS Capacity (scfh)	<b>4,449</b>	<b>4,958</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,005</b>	<b>1,371</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/10/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELD COUNTY T5N-R65W-S1 L01**

Consent Decree Tank System Number: **999**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_f$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_f$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>6</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>238</b>	<b>238</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,587</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELD COUNTY T5N-R65W-S1 L01**

Consent Decree Tank System Number: **999**

**Audit Notes**

The walkdown checklist (WELD COUNTY T5N-R65W-S1 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other supplied documentation in the final packet (WELD COUNTY T5N-R65W-S1 L01\_FINAL PACKET).

The STEM work request form (WELD COUNTY T5N-R65W-S1 L01\_FINAL PACKET, p 3) requests that the existing separator's 212 oil dump valve be replaced with a 1" 1400 with a 1/2" trim. The Job sheet (WELD COUNTY T5N-R65W-S1 L01\_FINAL PACKET, p 23) does not mention updating the valve or trim size. However, A1 of the walkdown checklist (WELD COUNTY T5N-R65W-S1 L01\_WALKDOWN) confirms the signed eval (WELD COUNTY T5N-R65W-S1 L01\_SIGNED EVAL) used the correct trim size. A 2" valve, the largest valve with a 1/2" trim, was used in the model to be conservative. It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The STEM work request form (WELD COUNTY T5N-R65W-S1 L01\_FINAL PACKET, p 3) requests that the existing 2" line on top of the tanks be replaced with a 3" line. The data request response from 12/10/2018 confirmed the VOC has been replaced with a 3" line.

The tank system consists of a single oil tank. The signed eval states that the certification max is 90% of the tank height and the control method is "Equalizer Height." A single tank battery does not have an equalizer line. Zero headspace surge capacity was used for this analysis and the Engineering Design Standard has not been strictly applied.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH AA T6N-R63W-S26 L01**

**Consent Decree Tank System Number:** **1575**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AA T6N-R63W-S26 L01_FINAL PACKET	.pdf	3/31/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AA T6N-R63W-S26 L01_STEM Engineering Evaluation_rev 1	.xlsm	4/1/2016	STEM Engineering Evaluation Spreadsheet
WELLS RANCH AA T6N-R63W-S26 L01_SIGNED EVAL	.pdf	4/13/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AA T6N-R63W-S26 L01_FINAL PACKET	.pdf	3/31/2016	Work Request
WELLS RANCH AA T6N-R63W-S26 L01_FINAL PACKET	.pdf	3/31/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AA T6N-R63W-S26 L01_FINAL PACKET	.pdf	3/31/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AA T6N-R63W-S26 L01_IR VERIFICATION	.pdf	3/30/2016	IR Verification Field Data Sheet
WELLS RANCH AA T6N-R63W-S26 L01_0800_NORMAL	.mp4	3/29/2016	IR Camera Video Normal Operations
WELLS RANCH AA T6N-R63W-S26 L01_0801_DUMP	.mp4	3/29/2016	IR Camera Video During Dump Event
WELLS RANCH AA T6N-R63W-S26 L01_0802_POST	.mp4	3/29/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AA T6N-R63W-S26 L01_SIGNED EVAL	.pdf	4/13/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH AA T6N-R63W-S26 L01**

**Consent Decree Tank System Number:** **1575**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,582</b>	<b>13,584</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,096</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>22,846</b>	<b>22,846</b>	
Total VCS Capacity (scfh)	<b>27,942</b>	<b>32,046</b>	
VCS Capacity minus PPIVF (scfh)	<b>14,360</b>	<b>18,462</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 8/14/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/20/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AA T6N-R63W-S26 L01**

Consent Decree Tank System Number: **1575**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.50</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.61</b>							
Gas/Oil Ratio (scf/bbl)	<b>256.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>601</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>153</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.82</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>1184</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>303.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>11</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>12,639</b>	<b>12,639</b>
Oil Tank Working Rate	<b>469</b>	<b>468</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>13,584</b>	<b>13,582</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AA T6N-R63W-S26 L01**

Consent Decree Tank System Number: **1575**

### Audit Notes

CAB - There is no documentation that the separator PSHH was set to 140 psig as requested in the Stem Work Request Form ("Pneumatic PSHH: Set hi/lo controller to shut hi/low valve at 140 psig line pressure. According to the Field Data Sheets, the separator PRV is set to 275 psig.

Noble Response:

The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 4), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 140 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.'

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AE T6N-R62W-S5 L01**

Consent Decree Tank System Number: **1920**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE T6N-R62W-S5 L01_FINAL PACKET	.pdf	2/1/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE T6N-R62W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
WELLS RANCH AE T6N-R62W-S5 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE T6N-R62W-S5 L01_FINAL PACKET	.pdf	2/1/2016	Work Request
WELLS RANCH AE T6N-R62W-S5 L01_FINAL PACKET	.pdf	2/1/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE T6N-R62W-S5 L01_WALKDOWN	.pdf	1/26/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE T6N-R62W-S5 L01_IR VERIFICATION	.pdf	1/27/2016	IR Verification Field Data Sheet
WELLS RANCH AE T6N-R62W-S5 L01_0381_NORMAL	.mp4	1/27/2016	IR Camera Video Normal Operations
WELLS RANCH AE T6N-R62W-S5 L01_0382_DUMP	.mp4	1/27/2016	IR Camera Video During Dump Event
WELLS RANCH AE T6N-R62W-S5 L01_0383_POST	.mp4	1/27/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE T6N-R62W-S5 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH AE T6N-R62W-S5 L01**

**Consent Decree Tank System Number:** **1920**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>2"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>210</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,647</b>	<b>9,648</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,404</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>12,063</b>	<b>12,063</b>	
Total VCS Capacity (scfh)	<b>15,467</b>	<b>16,663</b>	
VCS Capacity minus PPIVF (scfh)	<b>5,820</b>	<b>7,015</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/25/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AE T6N-R62W-S5 L01**

Consent Decree Tank System Number: **1920**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.88							
Z2	-0.86							
Z3	0.98							
Z	2.00							
Gas/Oil Ratio (scf/bbl)	453.2							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	2.17							
Critical Pressure (psia) <sup>b</sup>	664							
Vapor Pressure (psia) <sup>c</sup>	223							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.80							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	476							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	215.6							
Working Flow (Mscfd) <sup>h,i</sup>	5							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	8,984	8,984
Oil Tank Working Rate	189	188
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	9,648	9,647

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AE T6N-R62W-S5 L01**

Consent Decree Tank System Number: **1920**

**Audit Notes**

**Separator Max Operating Pressure**

The STEM Work Request Form (Final Packet, pg 3) requests the separator onsite be set to operate at no higher than 210 psig. Check #1 on the Signed Walkdown Form (Final Packet, pg 24) is checked "complete", confirming all items on the Work Request Form have been completed. This confirms the separator onsite is set at no higher than 210 psig.

**Oil Dump Valve and Trim Size**

The STEM Work Request Form (Final Packet, pg 3) requests a 1" oil dump valve with 1/4" trim be installed in the separator onsite. Check #1 on the Signed Walkdown Form (Final Packet, pg 24) is checked "complete", confirming all items on the Work Request Form have been completed. Therefore it is confirmed the oil dump valve currently onsite is a 1" sized valve with 1/4" trim. ITEM A1 of the STEM Walkdown Checklist (Final Packet, pg 5) is checked "yes", indicating the oil dump trim is consistent with the Engineering Evaluation and therefore is 1/4".



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01**

Consent Decree Tank System Number: **1972**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_FINAL PACKET	.pdf	1/21/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	2/1/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_SIGNED EVAL	.pdf	2/1/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_FINAL PACKET	.pdf	1/21/2016	Work Request
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_FINAL PACKET	.pdf	1/21/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_WALKDOWN	.pdf	6/24/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_IR VERIFICATION	.pdf	6/24/2015	IR Verification Field Data Sheet
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_0290_NORMAL	.mp4	6/24/2015	IR Camera Video Normal Operations
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_0292_DUMP	.mp4	6/24/2015	IR Camera Video During Dump Event
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_0293_POST	.mp4	6/24/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01_SIGNED EVAL	.pdf	2/1/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01**

**Consent Decree Tank System Number:** **1972**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>9</b>
Oil Tank Capacity (bbl):	<b>533</b>
# of Water Tanks:	<b>3</b>
Water Tank Capacity (bbl):	<b>533</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>6"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>					
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>	<b>2" &amp; 2"</b>	<b>2" &amp; 2"</b>					

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>		
Dump Valve Size & Trim Size (in)	<b>2" &amp; 2"</b>	<b>2" &amp; 2"</b>	<b>2" &amp; 2"</b>	<b>2" &amp; 2"</b>	<b>2" &amp; 2"</b>	<b>2" &amp; 2"</b>		

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>4</b>			
Man. Capacity (MSCFD)	<b>109,272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>154,038</b>	<b>154,096</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>13,622</b>	<b>18,212</b>	
Headspace Surge Capacity (scfh)	<b>752,611</b>	<b>752,611</b>	
Total VCS Capacity (scfh)	<b>766,233</b>	<b>770,823</b>	
VCS Capacity minus PPIVF (scfh)	<b>612,195</b>	<b>616,727</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 8/30/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01**

Consent Decree Tank System Number: **1972**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02	-1.02					
Z2	-0.86	-0.86	-0.86					
Z3	0.98	0.98	0.98					
Z	-0.90	-0.90	-0.90					
Gas/Oil Ratio (scf/bbl)	22.9	22.9	22.9					

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.76	0.76	0.76					
Valve Coefficient (gpm/psi) ( $C_v$ )	57.00	57.00	57.00					
Critical Pressure (psia) <sup>b</sup>	833	833	833					
Vapor Pressure (psia) <sup>c</sup>	407	407	407					
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76	0.76					
Choked Flow? <sup>e</sup>	Yes	Yes	Yes					
Peak Flow (bopd) <sup>f,g</sup>	18282	18282	18282					

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	418.7	418.7	418.7					
Working Flow (Mscfd) <sup>h,i</sup>	174	174	174					

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.76	0.76	0.76	0.76	0.76	0.76		
Valve Coefficient (gpm/psi) ( $C_v$ )	57.00	57.00	57.00	57.00	57.00	57.00		
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200	3200	3200		
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1	1	1		
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96	0.96	0.96		
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes	Yes	Yes		
Peak Flow (bwpd) <sup>f,g</sup>	30133	30133	30133	30133	30133	30133		

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	121	121	121	121	121	121		
Working Flow (Mscfd) <sup>l</sup>	169	169	169	169	169	169		

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	533	533
scfh vapor/tank <sup>i</sup>	422	422
Mscfd	91	30

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	52,339	52,339
Oil Tank Working Rate	21,733	21,679
Water Tank Flash Rate	30,133	30,131
Water Tank Working Rate	42,296	42,293
Tank Breathing Rate	5,069	5,069
Truck Loading Vapor	2,527	2,527
Total	154,096	154,038

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AE08 ECONODE T6N-R62W-S8 L01**

Consent Decree Tank System Number: **1972**

**Audit Notes**

**Separator Operating Pressure - Request Additional Data**

The Engineering Evaluation indicates the max separator operating pressure onsite for all separators is 400 psig which is the pipeline ESD shut in pressure.

**Separator Oil/Water Valve Trim**

The Engineering Evaluation indicates all separators onsite have a 2" valve trim size for both the oil and water dump valves. The field datasheet (Final Packet, pg 10) indicates all the actual valve trims onsite are 2" or smaller depending on the separator. If a smaller than 2" valve trim is installed on a separator the PPIVFR is conservatively being overestimated and the modeling guideline is being met. No action required.

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AF T5N-R62W-S6 L03**

Consent Decree Tank System Number: **337**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S6 L03_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S6 L03_STEM Engineering Evaluation_rev1	.xls	7/11/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH AF T5N-R62W-S6 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S6 L03_FINAL PACKET	.pdf	7/11/2018	Work Request
WELLS RANCH AF T5N-R62W-S6 L03_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S6 L03_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S6 L03_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
WELLS RANCH AF T5N-R62W-S6 L03_0806_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WELLS RANCH AF T5N-R62W-S6 L03_0807_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WELLS RANCH AF T5N-R62W-S6 L03_0808_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S6 L03_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AF T5N-R62W-S6 L03**

Consent Decree Tank System Number: **337**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>2</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>14,058</b>	<b>14,059</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>8,202</b>	<b>16,267</b>	
Headspace Surge Capacity (scfh)	<b>32,620</b>	<b>32,620</b>	
Total VCS Capacity (scfh)	<b>40,822</b>	<b>48,887</b>	
VCS Capacity minus PPIVF (scfh)	<b>26,764</b>	<b>34,827</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 11/16/2018

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AF T5N-R62W-S6 L03**

Consent Decree Tank System Number: **337**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50							
Z2	-0.86							
Z3	0.98							
Z	1.61							
Gas/Oil Ratio (scf/bbl)	256.2							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	601							
Vapor Pressure (psia) <sup>c</sup>	153							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.82							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1184							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	303.3							
Working Flow (Mscfd) <sup>h,i</sup>	11							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	23	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	12,639	12,639
Oil Tank Working Rate	469	468
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>14,059</b>	<b>14,058</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AF T5N-R62W-S6 L03**

Consent Decree Tank System Number: **337**

### Audit Notes

The stem work request form (PG 3 of Final Packet pdf) states for the pneumatic pshh to set the hp hi/lo no higher than 140 psig however nowhere in the job sheets (PGs 19-23) does it confirm this task was completed.

Noble provided a response to the above discrepancy on 11/14/2018 that states "The 'STEM Work Request Form' (Final Packet - page 3), 'STEM Design Confirmation Form' (Final Packet - page 4), the signed 'Vapor Control System Engineering Evaluation' (Signed Eval - page 1), the signed 'Vapor Control System Engineering Evaluation' (Final Signed STEM Plan - page 16), and 'One Pager' (laminated and posted on location) provide consistent documentation that the maximum separator operating pressure was set to no higher than 140 psig as requested. Signature on the Final Packet ensures work was executed per the 'STEM Work Request Form.' "

The stem work request (PG 3 of the Final Packet) states the existing 2" VOC line on the top of the tank was to be replaced with a 3" VOC line down to the KO pot however nowhere in the Job Sheets (PGs 19-23 of the Final Packet) does it confirm this task was completed

Noble provided a response to the above discrepancy on 11/14/2018 that states "Field verification for this facility was completed on or around 2/16/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed."



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AF T5N-R62W-S8 L01**

Consent Decree Tank System Number: **343**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S8 L01_FINAL PACKET	.pdf	9/17/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S8 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH AF T5N-R62W-S8 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S8 L01_FINAL PACKET	.pdf	9/17/2015	Work Request
WELLS RANCH AF T5N-R62W-S8 L01_FINAL PACKET	.pdf	9/17/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S8 L01_WALKDOWN	.pdf	9/17/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S8 L01_IR VERIFICATION	.pdf	9/15/2015	IR Verification Field Data Sheet
WELLS RANCH AF T5N-R62W-S8 L01_0261_NORMAL	.mp4	9/15/2015	IR Camera Video Normal Operations
WELLS RANCH AF T5N-R62W-S8 L01_0262_DUMP	.mp4	9/15/2015	IR Camera Video During Dump Event
WELLS RANCH AF T5N-R62W-S8 L01_0263_POST	.mp4	9/15/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH AF T5N-R62W-S8 L01_SIGNED EVAL	.pdf	1/4/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WELLS RANCH AF T5N-R62W-S8 L01  
**Consent Decree Tank System Number:** 343

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>15</b>
Oil Tank Capacity (bbbl):	<b>300</b>
# of Water Tanks:	<b>2</b>
Water Tank Capacity (bbbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>4 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>	<b>400</b>	<b>400</b>				
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>				

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>	<b>COMM 200 48"</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>109.272</b>	<b>157</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>41,304</b>	<b>43,458</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>7,813</b>	<b>11,095</b>	
Headspace Surge Capacity (scfh)	<b>125,543</b>	<b>125,543</b>	
Total VCS Capacity (scfh)	<b>133,356</b>	<b>136,638</b>	
VCS Capacity minus PPIVF (scfh)	<b>92,052</b>	<b>93,179</b>	

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 8/3/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/2/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AF T5N-R62W-S8 L01**

Consent Decree Tank System Number: **343**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	-0.90	-0.90						
Gas/Oil Ratio (scf/bbl)	22.9	22.9						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	833	833						
Vapor Pressure (psia) <sup>c</sup>	407	407						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	6905	6905						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	158.2	158.2						
Working Flow (Mscfd) <sup>h,i</sup>	66	66						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77	0.77	0.77				
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25	21.25	21.25				
Critical Pressure (psia) <sup>j</sup>	3200	3200	3200	3200				
Vapor Pressure (psia) <sup>k</sup>	1	1	1	1				
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.96	0.96	0.96	0.96				
Choked Flow? <sup>e</sup>	Yes	Yes	Yes	Yes				
Peak Flow (bwpd) <sup>f,g</sup>	11381	11381	11381	11381				

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	46	46	46	46				
Working Flow (Mscfd) <sup>l</sup>	64	64	64	64				

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	300
scfh vapor/tank <sup>i</sup>	238	238
Mscfd	86	11

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	13,179	13,179
Oil Tank Working Rate	5,473	5,459
Water Tank Flash Rate	7,588	7,587
Water Tank Working Rate	10,650	10,650
Tank Breathing Rate	4,042	1,902
Truck Loading Vapor	2,527	2,527
Total	43,458	41,304

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH AF T5N-R62W-S8 L01**

Consent Decree Tank System Number: **343**

**Audit Notes**

NEI did not include breathing losses from the non-production accepting tank bank in the Engineering Evaluation. The facility configuration has two banks - one bank with seven (7) oil tanks and one water tank, and another bank with eight (8) oil tanks and one water tank. By excluding the breathing losses from the non-production accepting bank which continued to store oil, the correct application of the Modeling Guidelines cannot be verified.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH BB T5N-R63W-S12 L01**

Consent Decree Tank System Number: **1591**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T5N-R63W-S12 L01_FINAL PACKET	.pdf	3/24/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T5N-R63W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	4/4/2016	STEM Engineering Evaluation Spreadsheet
WELLS RANCH BB T5N-R63W-S12 L01_SIGNED EVAL	.pdf	4/4/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T5N-R63W-S12 L01_FINAL PACKET	.pdf	3/24/2016	Work Request
WELLS RANCH BB T5N-R63W-S12 L01_FINAL PACKET	.pdf	3/24/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T5N-R63W-S12 L01_WALKDOWN	.pdf	3/17/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T5N-R63W-S12 L01_IR VERIFICATION	.pdf	3/17/2016	IR Verification Field Data Sheet
WELLS RANCH BB T5N-R63W-S12 L01_0780_NORMAL	.mp4	3/17/2016	IR Camera Video Normal Operations
WELLS RANCH BB T5N-R63W-S12 L01_0781_DUMP	.mp4	3/17/2016	IR Camera Video During Dump Event
WELLS RANCH BB T5N-R63W-S12 L01_0782_POST	.mp4	3/17/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T5N-R63W-S12 L01_SIGNED EVAL	.pdf	4/4/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH BB T5N-R63W-S12 L01**

Consent Decree Tank System Number: **1591**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>TEC 4-CS (48" Tornado)</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>140</b>	<b>110.4</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,582</b>	<b>13,584</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,809</b>	<b>10,433</b>	
Headspace Surge Capacity (scfh)	<b>20,077</b>	<b>20,077</b>	
Total VCS Capacity (scfh)	<b>24,886</b>	<b>30,510</b>	
VCS Capacity minus PPIVF (scfh)	<b>11,304</b>	<b>16,926</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/26/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH BB T5N-R63W-S12 L01**

Consent Decree Tank System Number: **1591**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50							
Z2	-0.86							
Z3	0.98							
Z	1.61							
Gas/Oil Ratio (scf/bbl)	256.2							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	601							
Vapor Pressure (psia) <sup>c</sup>	153							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.82							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1184							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	303.3							
Working Flow (Mscfd) <sup>h,i</sup>	11							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	12,639	12,639
Oil Tank Working Rate	469	468
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>13,584</b>	<b>13,582</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH BB T5N-R63W-S12 L01**

Consent Decree Tank System Number: **1591**

**Audit Notes**

**Tank Combustors**

Field Datasheet (Final Packet, pg 13) confirms a LEED HOC 48" (same as LEED 48" Gen 1 #7) existing onsite, this combustor has not been modified and exists onsite currently. Pg 21 of Final Packet shows an additional tank burner was installed onsite. The burner serial number and actuator serial number that are given are consistent with that of a Tornado 48" burner. This confirms a LEED and Tornado tank burner onsite.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH BB T6N-R63W-S12 L02**

Consent Decree Tank System Number: **1592**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T6N-R63W-S12 L02_FINAL PACKET	.pdf	3/24/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T6N-R63W-S12 L02_STEM Engineering Evaluation_rev1	.xlsm	4/1/2016	STEM Engineering Evaluation Spreadsheet
WELLS RANCH BB T6N-R63W-S12 L02_SIGNED EVAL	.pdf	4/4/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T6N-R63W-S12 L02_FINAL PACKET	.pdf	3/24/2016	Work Request
WELLS RANCH BB T6N-R63W-S12 L02_FINAL PACKET	.pdf	3/24/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T6N-R63W-S12 L02_WALKDOWN	.pdf	3/17/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T6N-R63W-S12 L02_IR VERIFICATION	.pdf	3/17/2016	IR Verification Field Data Sheet
WELLS RANCH BB T6N-R63W-S12 L02_0783_NORMAL	.mp4	3/17/2016	IR Camera Video Normal Operations
WELLS RANCH BB T6N-R63W-S12 L02_0784_DUMP	.mp4	3/17/2016	IR Camera Video During Dump Event
WELLS RANCH BB T6N-R63W-S12 L02_0785_POST	.mp4	3/17/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH BB T6N-R63W-S12 L02_SIGNED EVAL	.pdf	4/4/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH BB T6N-R63W-S12 L02**

**Consent Decree Tank System Number:** **1592**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,582</b>	<b>14,167</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,413</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>18,368</b>	<b>18,368</b>	
Total VCS Capacity (scfh)	<b>22,781</b>	<b>30,035</b>	
VCS Capacity minus PPIVF (scfh)	<b>9,199</b>	<b>15,868</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH BB T6N-R63W-S12 L02**

Consent Decree Tank System Number: **1592**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50							
Z2	-0.86							
Z3	0.98							
Z	1.61							
Gas/Oil Ratio (scf/bbl)	256.2							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	601							
Vapor Pressure (psia) <sup>c</sup>	153							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.82							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1237							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	316.8							
Working Flow (Mscfd) <sup>h,i</sup>	12							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	13,202	12,639
Oil Tank Working Rate	490	468
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>14,167</b>	<b>13,582</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH BB T6N-R63W-S12 L02**

Consent Decree Tank System Number: **1592**

**Audit Notes**

**Oil Dump Valve Size - Unknown**

Field Datasheet (Final Packet, pg 12) shows the separator onsite originally had a 2" oil dump valve with unknown trim size. The Engineering Evaluation shows a 1" oil dump valve with 1/2" trim currently onsite. The Job Sheet (Final Packet, pg 20) confirms the oil dump trim size was checked onsite and is consistent with the trim size in the STEM Work Request (Final Packet, pg 3), 1/2".

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the separator. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH T5N-R62W-S7 L01**

Consent Decree Tank System Number: **1880**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH T5N-R62W-S7 L01_FINAL PACKET	.pdf	5/8/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH T5N-R62W-S7 L01_STEM Engineering Evaluation_rev1	.xlsm	3/28/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH T5N-R62W-S7 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH T5N-R62W-S7 L01_FINAL PACKET	.pdf	5/8/2018	Work Request
WELLS RANCH T5N-R62W-S7 L01_FINAL PACKET	.pdf	5/8/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH T5N-R62W-S7 L01_WALKDOWN	.pdf	5/11/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH T5N-R62W-S7 L01_IR VERIFICATION	.pdf	5/10/2016	IR Verification Field Data Sheet
WELLS RANCH T5N-R62W-S7 L01_0951_NORMAL	.mp4	5/9/2016	IR Camera Video Normal Operations
WELLS RANCH T5N-R62W-S7 L01_0952_DUMP	.mp4	5/9/2016	IR Camera Video During Dump Event
WELLS RANCH T5N-R62W-S7 L01_0953_POST	.mp4	5/9/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH T5N-R62W-S7 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH T5N-R62W-S7 L01**

**Consent Decree Tank System Number:** **1880**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>90</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>	<b>LEED 48" Gen 1 #7</b>	
Number of Units	<b>1</b>	<b>1</b>	<b>1</b>	
Man. Capacity (MSCFD)	<b>140</b>	<b>140</b>	<b>140</b>	

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>6,484</b>	<b>6,485</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,955</b>	<b>17,500</b>	
Headspace Surge Capacity (scfh)	<b>1,150</b>	<b>1,150</b>	
Total VCS Capacity (scfh)	<b>9,105</b>	<b>18,650</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,621</b>	<b>12,165</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 11/26/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH T5N-R62W-S7 L01**

Consent Decree Tank System Number: **1880**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.04</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.16</b>							
Gas/Oil Ratio (scf/bbl)	<b>148.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>557</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>103</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.84</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>913</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>135.5</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>9</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>5,648</b>	<b>5,648</b>
Oil Tank Working Rate	<b>362</b>	<b>361</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>6,485</b>	<b>6,484</b>

## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH T5N-R62W-S7 L01**

Consent Decree Tank System Number: **1880**

### Audit Notes

The STEM Work Request indicated the 2" VOC line on the top of the oil storage tanks to the KO pot was to be replaced with a 3" line. There is no confirmation the Tanks to KO VCS piping was modified to 3".

Noble provided information on 11/14/2018 indicating a "Field verification for this facility was completed on or around 4/6/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed." The Engineering Design Standard was appropriately applied based on the provided field verification information.

The separator on location has pressure controlled by a pneumatic controller. The initial provided documentation did not confirm the controller shut-in pressure was set to 90 psig as requested in the STEM Work Request dated 3/3/2016.

The separator pneumatic PSHH is set by the operator, not automation personnel, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states the separator cannot operate above 90 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation. It was determined the Modeling Guidelines were appropriately applied based on the administrative use of the One-Pager.



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AA T6N-R63W-S11 L01**

**Consent Decree Tank System Number:** **362**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AA T6N-R63W-S11 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
WELLS RANCH USX AA T6N-R63W-S11 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
WELLS RANCH USX AA T6N-R63W-S11 L01_0945_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WELLS RANCH USX AA T6N-R63W-S11 L01_0946_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WELLS RANCH USX AA T6N-R63W-S11 L01_0947_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AA T6N-R63W-S11 L01**

**Consent Decree Tank System Number:** **362**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>2</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>	<b>2" &amp; 1/2"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>9,851</b>	<b>9,853</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>8,087</b>	<b>9,200</b>	
Headspace Surge Capacity (scfh)	<b>9,244</b>	<b>9,244</b>	
Total VCS Capacity (scfh)	<b>17,331</b>	<b>18,444</b>	
VCS Capacity minus PPIVF (scfh)	<b>7,480</b>	<b>8,591</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 12/21/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S11 L01**

Consent Decree Tank System Number: **362**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78	0.78						
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20	7.20						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	827	827						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	93.3	93.3						
Working Flow (Mscfd) <sup>h,i</sup>	8	8						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	34	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	7,771	7,771
Oil Tank Working Rate	655	654
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,426	1,426
Truck Loading Vapor	0	0
Total	9,853	9,851

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S11 L01**

Consent Decree Tank System Number: **362**

**Audit Notes**

VOC Line Size: Cannot verify VOC line size from KO to burners as 3". Pp 14 of Final Packet does not provide NPS for line from KO to burners.

Separator MOP: MOP cannot be verified as 70# by Job Sheets; QC Stem Checkout (pp 19 FP) shows "fail".

**Noble Data Request Response:**

Information received from the 6th Data Request confirms: 1) A document review on 11/27/18 verified the VOC line size from KO to Burner is 3" diameter; 2) Confirmed PSHH pressure set at 70 psig using information from original file - "See item B3 on walkdown checklist and item 1 of the walkdown indicating everything was completed".

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S11 L02**

Consent Decree Tank System Number: **1559**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L02_FINAL PACKET	.pdf	9/7/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L02_STEM Engineering Evaluation_rev1	.xlsm	5/2/2017	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AA T6N-R63W-S11 L02_SIGNED EVAL	.pdf	5/3/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L02_FINAL PACKET	.pdf	2/8/2017	Work Request
WELLS RANCH USX AA T6N-R63W-S11 L02_FINAL PACKET	.pdf	3/21/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L02_FINAL PACKET	.pdf	4/19/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L02_FINAL PACKET	.pdf	4/19/2017	IR Verification Field Data Sheet
WELLS RANCH USX AA T6N-R63W-S11 L02_1969_NORMAL	.mp4	4/19/2017	IR Camera Video Normal Operations
WELLS RANCH USX AA T6N-R63W-S11 L02_1970_DUMP	.mp4	4/19/2017	IR Camera Video During Dump Event
WELLS RANCH USX AA T6N-R63W-S11 L02_1971_POST	.mp4	4/19/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S11 L02_SIGNED EVAL	.pdf	5/3/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S11 L02**

Consent Decree Tank System Number: **1559**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>190</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/8"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,427</b>	<b>13,429</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>19,805</b>	<b>19,824</b>	
Total VCS Capacity (scfh)	<b>23,986</b>	<b>24,424</b>	
VCS Capacity minus PPIVF (scfh)	<b>10,559</b>	<b>10,995</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 12/17/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/18/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S11 L02**

Consent Decree Tank System Number: **1559**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>1.79</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.91</b>							
Gas/Oil Ratio (scf/bbl)	<b>391.5</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.91</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>3.22</b>							
Critical Pressure (psia) <sup>b</sup>	<b>646</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>203</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.80</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>775</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>303.5</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>12,646</b>	<b>12,646</b>
Oil Tank Working Rate	<b>307</b>	<b>306</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	13,429	13,427
-------	--------	--------



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S11 L02**

Consent Decree Tank System Number: **1559**

**Audit Notes**

Tornado ECD size not specified in provided documentation. Assuming ECD is 48" per Signed Engineering Evaluation (WELLS RANCH USX AA T6N-R63W-S11 L02\_SIGNED EVAL).

Pipe diameter from tanks to knock-out was documented at a 2" diameter on the field data sheets. The engineering evaluation was completed with a 3" diameter for this section.

The separator on location has pressure controlled by a pneumatic controller. The initial provided documentation did not confirm the controller shut-in pressure for the HP Separator was set to 190 psig as requested in the STEM Work Request dated 2/8/2017.

The separator pneumatic PSHH is set by the operator, not automation, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 190 psig and was posted on location via item A14 of the Walkdown Checklist. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S35 L02**

Consent Decree Tank System Number: **1977**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L02_FINAL PACKET	.pdf	6/2/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L02_STEM Engineering Evaluation_rev1	.xlsm	7/18/2017	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AA T6N-R63W-S35 L02_SIGNED EVAL	.pdf	7/18/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L02_FINAL PACKET	.pdf	6/2/2017	Work Request
WELLS RANCH USX AA T6N-R63W-S35 L02_FINAL PACKET	.pdf	6/2/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L02_WALKDOWN	.pdf	6/2/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L02_IR VERIFICATION	.pdf	5/30/2017	IR Verification Field Data Sheet
WELLS RANCH USX AA T6N-R63W-S35 L02_2086_NORMAL	.mp4	5/30/2017	IR Camera Video Normal Operations
WELLS RANCH USX AA T6N-R63W-S35 L02_2087_DUMP	.mp4	5/30/2017	IR Camera Video During Dump Event
WELLS RANCH USX AA T6N-R63W-S35 L02_2088_POST	.mp4	5/30/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L02_SIGNED EVAL	.pdf	7/18/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S35 L02**

Consent Decree Tank System Number: **1977**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>1</b>
Water Tank Capacity (bbl):	<b>300</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>Cimarron 48 HV</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>109.272</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>20,288</b>	<b>20,291</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,716</b>	<b>4,553</b>	
Headspace Surge Capacity (scfh)	<b>94,052</b>	<b>94,052</b>	
Total VCS Capacity (scfh)	<b>97,768</b>	<b>98,605</b>	
VCS Capacity minus PPIVF (scfh)	<b>77,480</b>	<b>78,314</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/30/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S35 L02**

Consent Decree Tank System Number: **1977**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_v$ )	<b>0.77</b>	<b>0.77</b>						
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>	<b>21.25</b>						
Critical Pressure (psia) <sup>j</sup>	<b>3200</b>	<b>3200</b>						
Vapor Pressure (psia) <sup>k</sup>	<b>1</b>	<b>1</b>						
Critical pressure ratio ( $F_r$ ) <sup>d</sup>	<b>0.96</b>	<b>0.96</b>						
Choked Flow? <sup>e</sup>	<b>Yes</b>	<b>Yes</b>						
Peak Flow (bwpd) <sup>f,g</sup>	<b>11381</b>	<b>5068</b>						

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>46</b>	<b>20</b>						
Working Flow (Mscfd) <sup>l</sup>	<b>64</b>	<b>28</b>						

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>300</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>238</b>
Mscfd	<b>29</b>	<b>6</b>

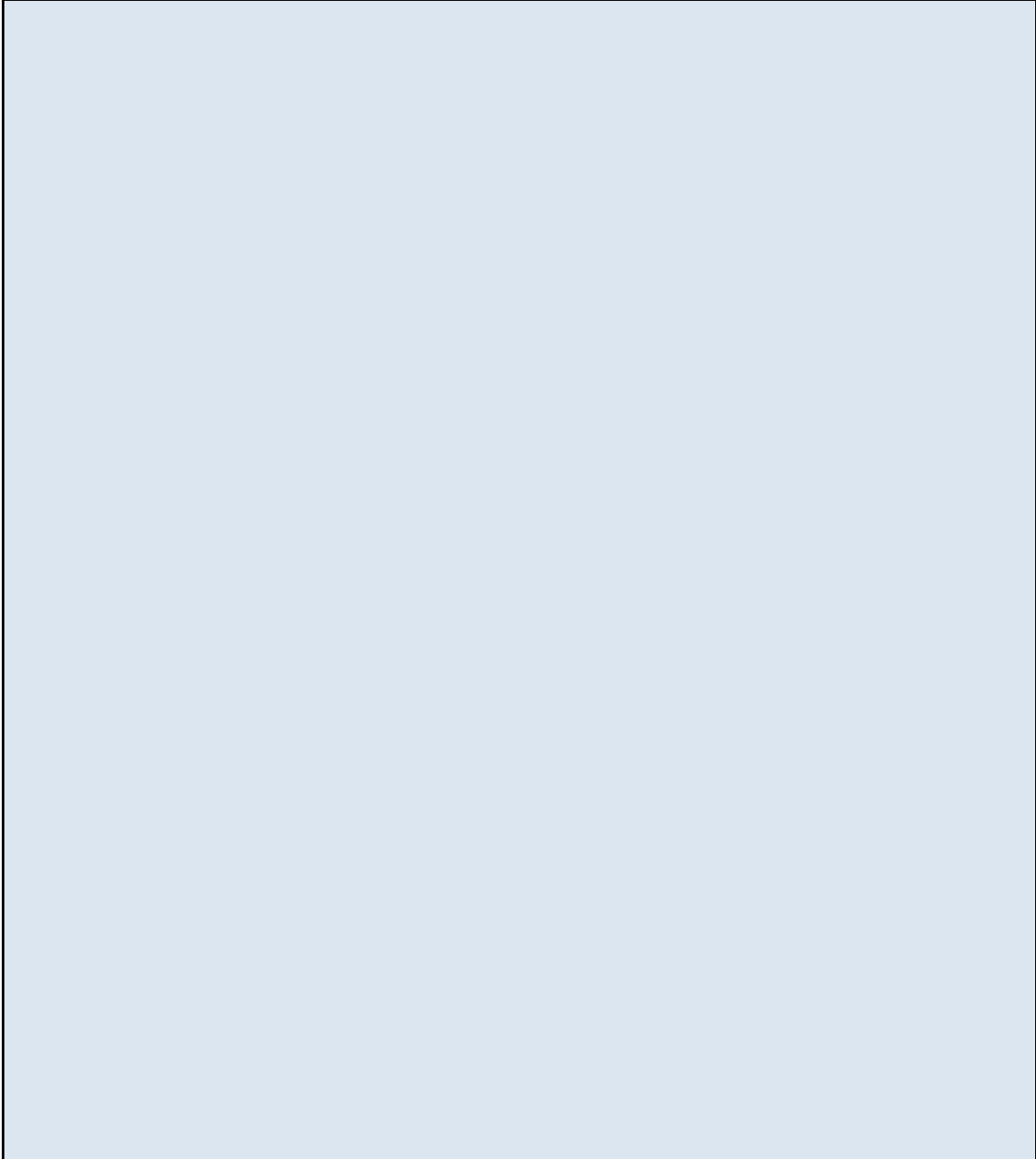
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>2,741</b>	<b>2,741</b>
Water Tank Working Rate	<b>3,848</b>	<b>3,848</b>
Tank Breathing Rate	<b>1,426</b>	<b>1,426</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>20,291</b>	<b>20,288</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S35 L02**

Consent Decree Tank System Number: **1977**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S35 L04**

Consent Decree Tank System Number: **1453**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L04_FINAL PACKET	.pdf	N/A	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L04_STEM Engineering Evaluation_rev1	.xlsm	4/28/2016	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AA T6N-R63W-S35 L04_SIGNED EVAL	.pdf	4/28/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L04_FINAL PACKET	.pdf	N/A	Work Request
WELLS RANCH USX AA T6N-R63W-S35 L04_FINAL PACKET	.pdf	N/A	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L04_WALKDOWN	.pdf	4/22/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L04_IR VERIFICATION	.pdf	4/22/2016	IR Verification Field Data Sheet
WELLS RANCH USX AA T6N-R63W-S35 L04_0903_Normal	.mp4	4/22/2016	IR Camera Video Normal Operations
WELLS RANCH USX AA T6N-R63W-S35 L04_0904_Dump	.mp4	4/22/2016	IR Camera Video During Dump Event
WELLS RANCH USX AA T6N-R63W-S35 L04_0905_Post	.mp4	4/22/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AA T6N-R63W-S35 L04_SIGNED EVAL	.pdf	4/28/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WELLS RANCH USX AA T6N-R63W-S35 L04

**Consent Decree Tank System Number:** 1453

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>13,345</b>	<b>14,167</b>	<b>6%</b>
Calculated Burner Capacity (scfh)	<b>5,719</b>	<b>9,153</b>	
Headspace Surge Capacity (scfh)	<b>11,489</b>	<b>12,208</b>	
Total VCS Capacity (scfh)	<b>17,208</b>	<b>21,361</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,863</b>	<b>7,194</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S35 L04**

Consent Decree Tank System Number: **1453**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50							
Z2	-0.86							
Z3	0.98							
Z	1.61							
Gas/Oil Ratio (scf/bbl)	256.2							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	601							
Vapor Pressure (psia) <sup>c</sup>	153							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.82							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1237							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	316.8							
Working Flow (Mscfd) <sup>h,i</sup>	12							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	13,202	12,639
Oil Tank Working Rate	490	468
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>14,167</b>	<b>13,345</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AA T6N-R63W-S35 L04**

Consent Decree Tank System Number: **1453**

**Audit Notes**

**Separator Max Operating Pressure**

The Field Datasheets (Final Packet, pg 22) show the separator onsite previously operated at 300 psig. The STEM Work Request Form (Final Packet, pg 5) requests the separator onsite be set to operate at no higher than 140 psig. Check #1 on the Signed Walkdown Form (Final Packet, pg 25) is checked "complete", confirming all items on the STEM Work Request Form have been completed. Therefore it is confirmed the separator onsite is set at no higher than 140 psig.

**Oil Dump Valve Size - Unknown**

Field Datasheet (Final Packet, pg 15) shows the separator onsite originally had a 2" oil dump valve with 1" trim size. The Engineering Evaluation shows a 1" oil dump valve onsite with 1/2" trim. The Job Sheet (Final Packet, pg 21) confirms the oil trim onsite was reduced to 1/2", indicating the oil dump trim size onsite is consistent with the trim size used in the Engineering Evaluation.

A 1" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the separator onsite. For the given trim size, 1/2", a 2" valve could be installed and therefore the Modeling Guideline cannot be confirmed as being strictly applied. Assuming a 2" valve size on the separator, the modeled results do not show an exceedance of the vapor control system capacity.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S21 L01**

Consent Decree Tank System Number: **1548**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L01_FINAL PACKET	.pdf	1/28/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AE T6N-R62W-S21 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L01_FINAL PACKET	.pdf	1/28/2016	Work Request
WELLS RANCH USX AE T6N-R62W-S21 L01_FINAL PACKET	.pdf	1/28/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L01_FINAL PACKET	.pdf	1/28/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L01_IR VERIFICATION	.pdf	1/26/2016	IR Verification Field Data Sheet
WELLS RANCH USX AE T6N-R62W-S21 L01_0375_NORMAL	.mp4	1/26/2016	IR Camera Video Normal Operations
WELLS RANCH USX AE T6N-R62W-S21 L01_0376_DUMP	.mp4	1/26/2016	IR Camera Video During Dump Event
WELLS RANCH USX AE T6N-R62W-S21 L01_0377_POST	.mp4	1/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L01_SIGNED EVAL	.pdf	7/8/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WELLS RANCH USX AE T6N-R62W-S21 L01

**Consent Decree Tank System Number:** 1548

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>165</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>18,435</b>	<b>18,437</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>34,647</b>	<b>34,647</b>	
Total VCS Capacity (scfh)	<b>38,199</b>	<b>39,247</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,764</b>	<b>20,810</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 5/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S21 L01**

Consent Decree Tank System Number: **1548**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.66							
Z2	-0.86							
Z3	0.98							
Z	1.77							
Gas/Oil Ratio (scf/bbl)	320.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	624							
Vapor Pressure (psia) <sup>c</sup>	178							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.81							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1307							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	418.7							
Working Flow (Mscfd) <sup>h,i</sup>	12							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	17,444	17,444
Oil Tank Working Rate	518	516
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>18,437</b>	<b>18,435</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S21 L01**

Consent Decree Tank System Number: **1548**

**Audit Notes**

**Separator Max Operating Pressure**

Field Datasheet (Final Packet, pg 7) show the separator onsite previously operating at 275 psig. The STEM Work Request Form (Final Packet, pg 3) requests the separator onsite be set to operate at no higher than 165 psig. Check #1 on the Signed Walkdown Form (Final Packet, pg 24) is checked "complete", confirming all items on the Work Request Form have been completed. Therefore it is confirmed the separator onsite is set at no higher than 165psig.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S21 L02**

Consent Decree Tank System Number: **1618**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L02_FINAL PACKET	.pdf	1/28/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L02_STEM Engineering Evaluation_rev1	.xls	5/31/2017	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AE T6N-R62W-S21 L02_SIGNED EVAL	.pdf	10/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L02_FINAL PACKET	.pdf	1/28/2016	Work Request
WELLS RANCH USX AE T6N-R62W-S21 L02_FINAL PACKET	.pdf	1/28/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L02_WALKDOWN	.pdf	1/28/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L02_IR VERIFICATION	.pdf	1/27/2016	IR Verification Field Data Sheet
WELLS RANCH USX AE T6N-R62W-S21 L02_0372_NORMAL	.mp4	1/26/2016	IR Camera Video Normal Operations
WELLS RANCH USX AE T6N-R62W-S21 L02_0373_DUMP	.mp4	1/26/2016	IR Camera Video During Dump Event
WELLS RANCH USX AE T6N-R62W-S21 L02_0374_POST	.mp4	1/26/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S21 L02_SIGNED EVAL	.pdf	6/7/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S21 L02**

Consent Decree Tank System Number: **1618**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,647</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>5,197</b>	<b>5,197</b>	
Total VCS Capacity (scfh)	<b>7,844</b>	<b>11,030</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,098</b>	<b>6,283</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 11/20/2017  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 12/27/2017



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S21 L02**

Consent Decree Tank System Number: **1618**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

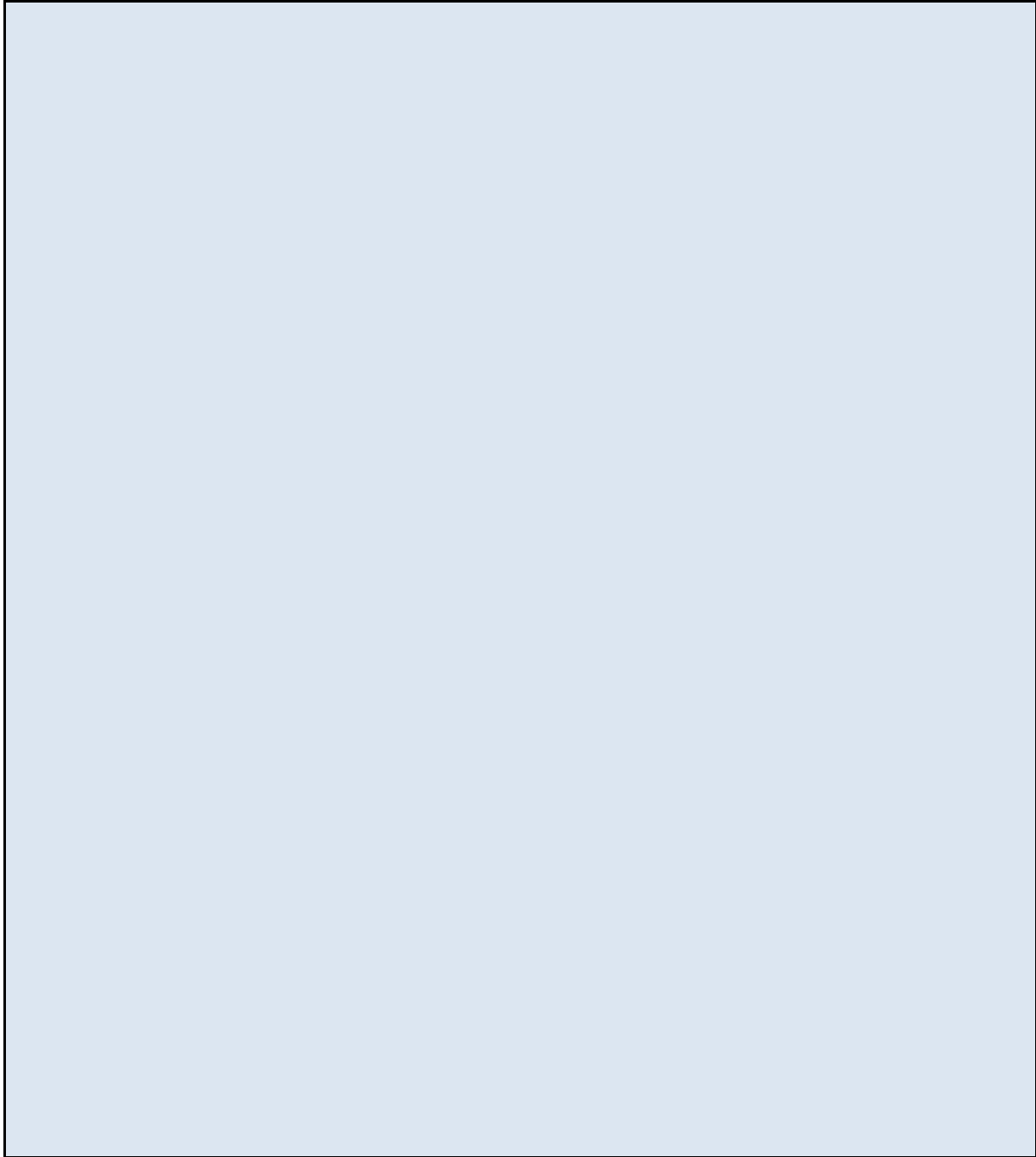


**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S21 L02**

Consent Decree Tank System Number: **1618**

**Audit Notes**



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AE T6N-R62W-S29 L01**

**Consent Decree Tank System Number:** **344**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L01_FINAL PACKET	.pdf	9/29/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L01_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AE T6N-R62W-S29 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L01_FINAL PACKET	.pdf	9/29/2015	Work Request
WELLS RANCH USX AE T6N-R62W-S29 L01_FINAL PACKET	.pdf	9/29/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L01_WALKDOWN	.pdf	9/29/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L01_IR VERIFICATION	.pdf	9/22/2015	IR Verification Field Data Sheet
WELLS RANCH USX AE T6N-R62W-S29 L01_0297_NORMAL	.mp4	9/22/2015	IR Camera Video Normal Operations
WELLS RANCH USX AE T6N-R62W-S29 L01_0298_DUMP	.mp4	9/22/2015	IR Camera Video During Dump Event
WELLS RANCH USX AE T6N-R62W-S29 L01_0299_POST	.mp4	9/22/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AE T6N-R62W-S29 L01**  
**Consent Decree Tank System Number:** **344**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>7</b>
Oil Tank Capacity (bbbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>2</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>	<b>70</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>28,736</b>	<b>28,741</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,063</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>35,855</b>	<b>35,855</b>	
Total VCS Capacity (scfh)	<b>40,918</b>	<b>42,397</b>	
VCS Capacity minus PPIVF (scfh)	<b>12,182</b>	<b>13,655</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 8/3/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/30/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S29 L01**

Consent Decree Tank System Number: **344**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.77	0.77						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	0.89	0.89						
Gas/Oil Ratio (scf/bbl)	112.8	112.8						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	539	539						
Vapor Pressure (psia) <sup>c</sup>	83	83						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85	0.85						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	2409	2409						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	271.7	271.7						
Working Flow (Mscfd) <sup>h,i</sup>	23	23						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	40	0

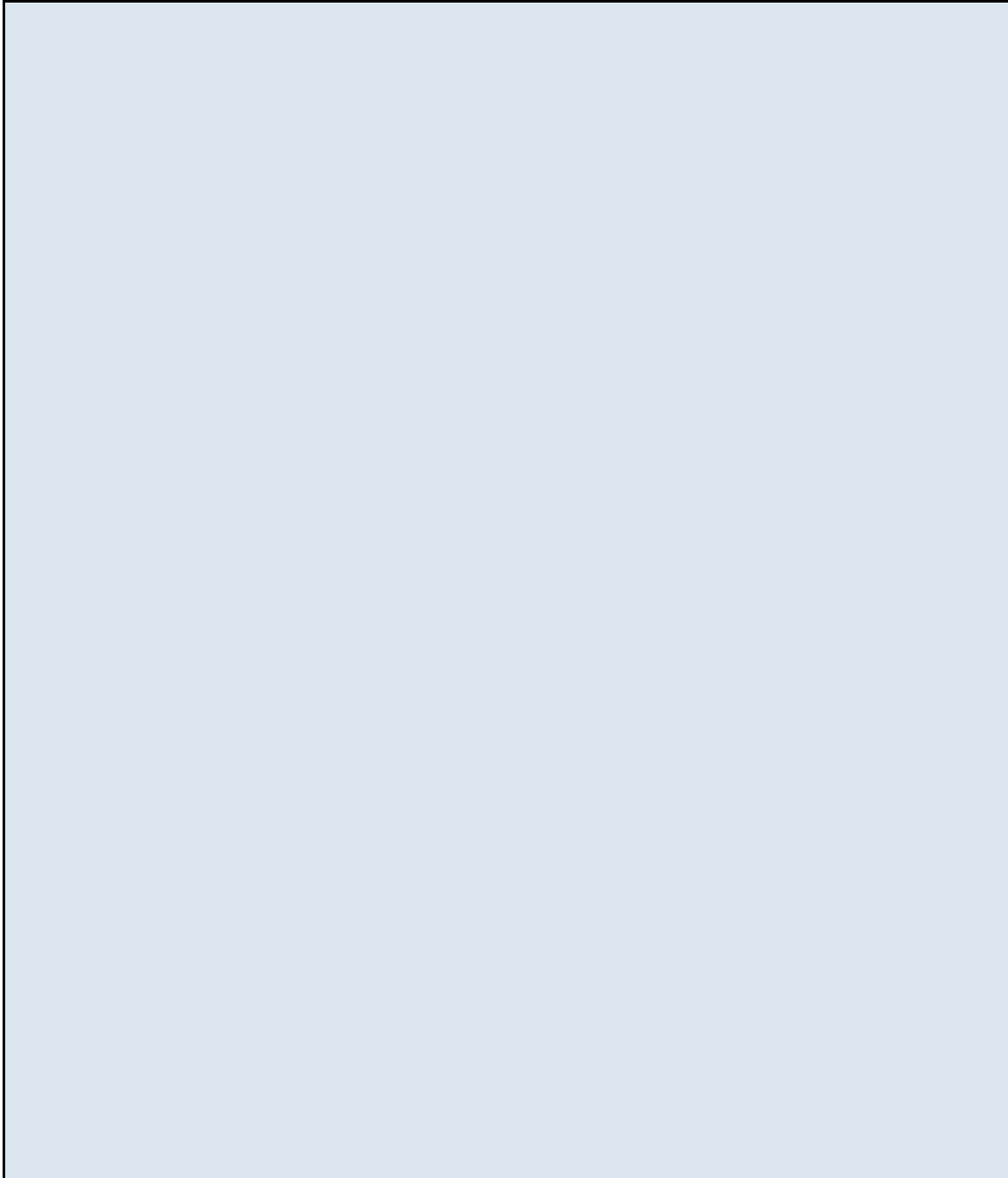
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	22,641	22,641
Oil Tank Working Rate	1,909	1,904
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,664	1,664
Truck Loading Vapor	2,527	2,527
Total	28,741	28,736

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S29 L01**

Consent Decree Tank System Number: **344**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S29 L02**

Consent Decree Tank System Number: **1983**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L02_FINAL PACKET	.pdf	10/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L02_STEM Engineering Evaluation_rev1	.xlsm	1/19/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AE T6N-R62W-S29 L02_SIGNED EVAL	.pdf	1/23/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L02_FINAL PACKET	.pdf	10/30/2015	Work Request
WELLS RANCH USX AE T6N-R62W-S29 L02_FINAL PACKET	.pdf	10/30/2015	Construction Jobsheets
WELLS RANCH USX AE T6N-R62W-S29 L02_COMPLETED TLO	.pdf	6/26/2018	Completed TLO Documents

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L02_WALKDOWN	.pdf	10/27/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L02_IR VERIFICATION UPDATED	.pdf	6/7/2018	IR Verification Field Data Sheet
WELLS RANCH USX AE T6N-R62W-S29 L02_0022_NORMAL UPDATED	.mp4	7/11/2018	IR Camera Video Normal Operations
WELLS RANCH USX AE T6N-R62W-S29 L02_0023_DUMP UPDATED	.mp4	7/11/2018	IR Camera Video During Dump Event
WELLS RANCH USX AE T6N-R62W-S29 L02_0024_POST UPDATED	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S29 L02_SIGNED EVAL	.pdf	1/23/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AE T6N-R62W-S29 L02**

**Consent Decree Tank System Number:** **1983**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>8</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>4 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>400</b>	<b>400</b>						
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>	<b>2" &amp; 1"</b>						

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>23,067</b>	<b>23,081</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,004</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>223,507</b>	<b>223,507</b>	
Total VCS Capacity (scfh)	<b>228,511</b>	<b>230,049</b>	
VCS Capacity minus PPIVF (scfh)	<b>205,444</b>	<b>206,968</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/26/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S29 L02**

Consent Decree Tank System Number: **1983**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	-1.02	-1.02						
Z2	-0.86	-0.86						
Z3	0.98	0.98						
Z	-0.90	-0.90						
Gas/Oil Ratio (scf/bbl)	22.9	22.9						

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.77	0.77						
Valve Coefficient (gpm/psi) ( $C_v$ )	21.25	21.25						
Critical Pressure (psia) <sup>b</sup>	833	833						
Vapor Pressure (psia) <sup>c</sup>	407	407						
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.76	0.76						
Choked Flow? <sup>e</sup>	Yes	Yes						
Peak Flow (bopd) <sup>f,g</sup>	6905	6905						

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	158.2	158.2						
Working Flow (Mscfd) <sup>h,i</sup>	66	66						

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	46	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	13,179	13,179
Oil Tank Working Rate	5,473	5,459
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	1,902	1,902
Truck Loading Vapor	2,527	2,527
Total	23,081	23,067



## Engineering Evaluation Verification Audit

Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S29 L02**

Consent Decree Tank System Number: **1983**

### Audit Notes

No comments, provided documentation is consistent with Modeling Guideline, Engineering Design Standard and itself.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L01**

Consent Decree Tank System Number: **1549**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L01_FINAL PACKET	.pdf	11/14/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L01_STEM Engineering Evaluation_rev1	.xlsm	7/8/2016	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AE T6N-R62W-S31 L01_Final Signed STEM Plan	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L01_FINAL PACKET	.pdf	11/14/2017	Work Request
WELLS RANCH USX AE T6N-R62W-S31 L01_FINAL PACKET	.pdf	11/14/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L01_WALKDOWN	.pdf	2/1/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L01_IR VERIFICATION	.pdf	2/1/2016	IR Verification Field Data Sheet
WELLS RANCH USX AE T6N-R62W-S31 L01_0378_NORMAL	.mp4	1/27/2016	IR Camera Video Normal Operations
WELLS RANCH USX AE T6N-R62W-S31 L01_0379_DUMP	.mp4	1/27/2016	IR Camera Video During Dump Event
WELLS RANCH USX AE T6N-R62W-S31 L01_0380_POST	.mp4	1/27/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L01_SIGNED EVAL	.pdf	7/14/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AE T6N-R62W-S31 L01**

**Consent Decree Tank System Number:** **1549**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>85</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>	<b>Cimarron 48 HV</b>		
Number of Units	<b>1</b>	<b>1</b>		
Man. Capacity (MSCFD)	<b>110.4</b>	<b>109.272</b>		

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>5,947</b>	<b>5,949</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>7,411</b>	<b>9,153</b>	
Headspace Surge Capacity (scfh)	<b>1,359</b>	<b>1,359</b>	
Total VCS Capacity (scfh)	<b>8,770</b>	<b>10,512</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,823</b>	<b>4,563</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 2/21/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L01**

Consent Decree Tank System Number: **1549**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.98</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>1.10</b>							
Gas/Oil Ratio (scf/bbl)	<b>139.2</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>552</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>98</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.84</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>884</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>123.0</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>5,123</b>	<b>5,123</b>
Oil Tank Working Rate	<b>350</b>	<b>349</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

Total	5,949	5,947
-------	-------	-------

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L01**

Consent Decree Tank System Number: **1549**

**Audit Notes**

THE WALKDOWN CHECKLIST WAS NOT MARKED COMPLETE.

CB - Headspace Tank: The original work specified the creation of a headspace tank (Work Request pg. 3). The Job Sheet confirmed the creation of a headspace tank (pg. 21). Subsequent rework specified the elimination of the headspace tank to return it to full service (Work Request pg 27). The signed evaluation correctly considers no headspace tank (2 oil tanks @ 90% capacity).

CB - PSHH @ 85 psig: Subsequent rework specified the use of a pneumatic PSHH set on the hi/lo controller to be set at 85 psig. There is no confirmation in the field data that this setting was accomplished. The signed evaluation uses 85 psig as the certification max for the HP separator.

Noble has provided the following response regarding the pneumatic pshh setting on the hp; "The separator pneumatic PSHH is set by the operator, not automation, and therefore no QA/QC checklist was provided to confirm the maximum pressure of the separator. The STEM One-Pager states that the separator cannot operate above 85 psig and was posted on location via Walkdown Checklist Item A14. This serves as confirmation of administrative controls in place to keep the separator below the maximum pressure used in the Engineering Evaluation."

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L02**

Consent Decree Tank System Number: **340**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L02_FINAL PACKET	.pdf	10/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L02_STEM Engineering Evaluation_rev1	.xlsm	6/28/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AE T6N-R62W-S31 L02_SIGNED EVAL	.pdf	7/21/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L02_FINAL PACKET	.pdf	10/30/2015	Work Request
WELLS RANCH USX AE T6N-R62W-S31 L02_FINAL PACKET	.pdf	10/30/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L02_WALKDOWN	.pdf	10/30/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L02_IR VERIFICATION	.pdf	3/22/2018	IR Verification Field Data Sheet
WELLS RANCH USX AE T6N-R62W-S31 L02_0383_NORMAL	.mp4	10/26/2015	IR Camera Video Normal Operations
WELLS RANCH USX AE T6N-R62W-S31 L02_0384_DUMP	.mp4	10/26/2015	IR Camera Video During Dump Event
WELLS RANCH USX AE T6N-R62W-S31 L02_0385_POST	.mp4	10/26/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L02_SIGNED EVAL	.pdf	7/21/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AE T6N-R62W-S31 L02**

**Consent Decree Tank System Number:** **340**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>140</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>2</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>14,058</b>	<b>14,059</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>5,502</b>	<b>11,667</b>	
Headspace Surge Capacity (scfh)	<b>28,245</b>	<b>28,245</b>	
Total VCS Capacity (scfh)	<b>33,747</b>	<b>39,912</b>	
VCS Capacity minus PPIVF (scfh)	<b>19,689</b>	<b>25,852</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 8/31/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/2/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L02**

Consent Decree Tank System Number: **340**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.50							
Z2	-0.86							
Z3	0.98							
Z	1.61							
Gas/Oil Ratio (scf/bbl)	256.2							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	601							
Vapor Pressure (psia) <sup>c</sup>	153							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.82							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1184							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	303.3							
Working Flow (Mscfd) <sup>h,i</sup>	11							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	23	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	12,639	12,639
Oil Tank Working Rate	469	468
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	951	951
Truck Loading Vapor	0	0
<b>Total</b>	<b>14,059</b>	<b>14,058</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L02**

Consent Decree Tank System Number: **340**

**Audit Notes**

A STEM Work Request required the wells be grouped together as the separators are not allowed to run simultaneously. The verbiage between the Work Request and the Job Sheet is consistent indicating the automation modifications have been completed.

The Engineering Evaluation was completed with separator maximum operating pressure of 140 psig. The STEM Work Request to control the pneumatic controller for the Hi/Lo valve to shut in at 140 psig line pressure. No documentation was provided to indicate the set points were modified or confirmed to 140 psig.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L03**

Consent Decree Tank System Number: **341**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L03_FINAL PACKET	.pdf	8/21/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L03_STEM Engineering Evaluation_rev1_with TLO	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AE T6N-R62W-S31 L03_SIGNED EVAL	.pdf	1/2/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L03_FINAL PACKET	.pdf	8/21/2015	Work Request
WELLS RANCH USX AE T6N-R62W-S31 L03_FINAL PACKET	.pdf	8/21/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L03_WALKDOWN	.pdf	8/19/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L03_IR VERIFICATION	.pdf	8/20/2015	IR Verification Field Data Sheet
WELLS RANCH USX AE T6N-R62W-S31 L03_0241_NORMAL	.mp4	8/20/2015	IR Camera Video Normal Operations
WELLS RANCH USX AE T6N-R62W-S31 L03_0242_DUMP	.mp4	8/20/2015	IR Camera Video During Dump Event
WELLS RANCH USX AE T6N-R62W-S31 L03_0243_POST	.mp4	8/20/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L03_SIGNED EVAL	.pdf	1/2/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AE T6N-R62W-S31 L03**

**Consent Decree Tank System Number:** **341**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,751</b>	<b>15,753</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,672</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>75,064</b>	<b>75,064</b>	
Total VCS Capacity (scfh)	<b>78,736</b>	<b>81,606</b>	
VCS Capacity minus PPIVF (scfh)	<b>62,985</b>	<b>65,853</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Brian Cherwien  
 Audit Document Review Date: 8/3/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 9/30/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L03**

Consent Decree Tank System Number: **341**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>l</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

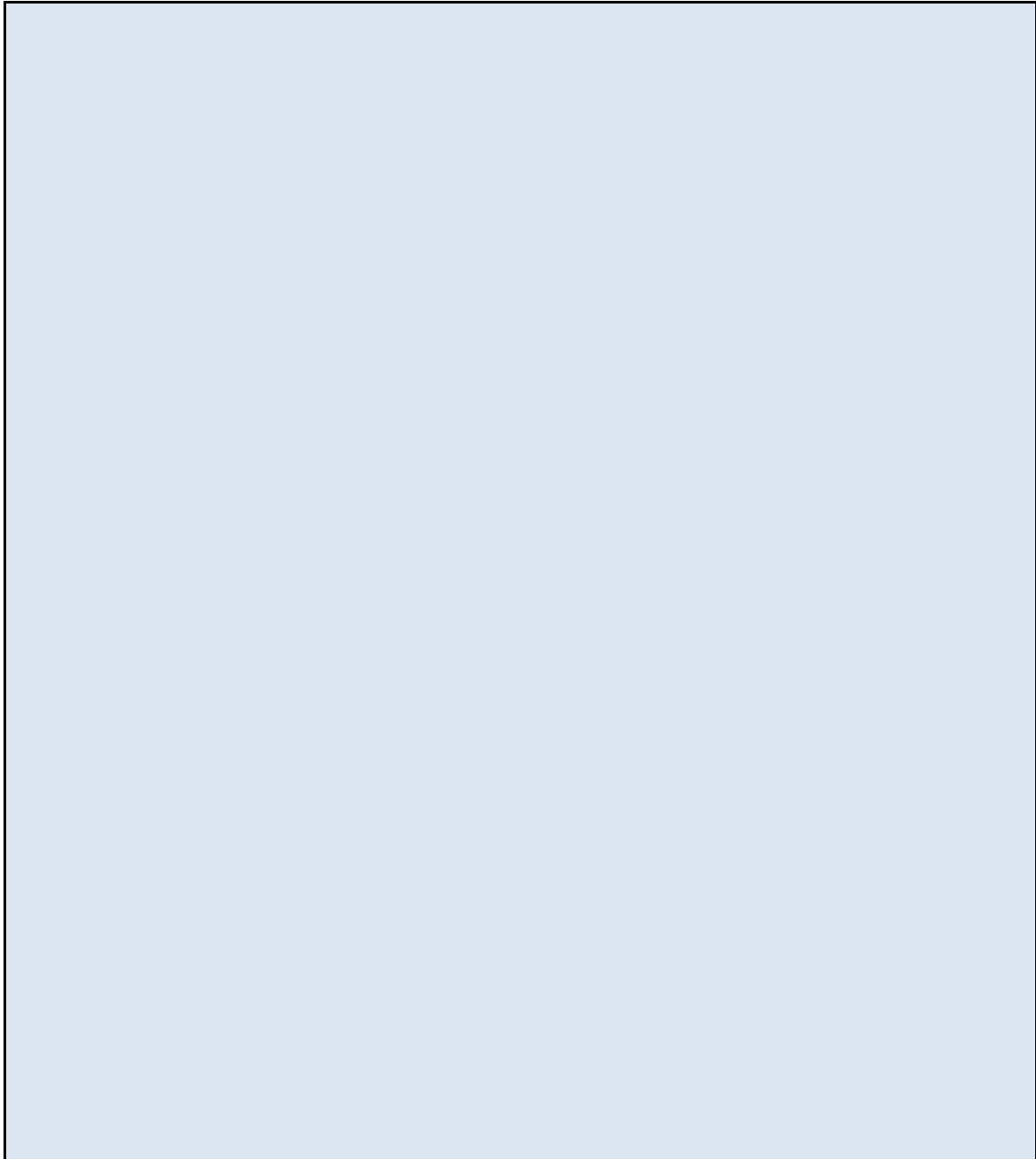
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>15,753</b>	<b>15,751</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L03**

Consent Decree Tank System Number: **341**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L04**

Consent Decree Tank System Number: **339**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L04_FINAL PACKET	.pdf	9/29/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L04_STEM Engineering Evaluation_rev1_with TLO	.xlsm	3/5/2015	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX AE T6N-R62W-S31 L04_SIGNED EVAL	.pdf	1/3/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L04_FINAL PACKET	.pdf	9/29/2015	Work Request
WELLS RANCH USX AE T6N-R62W-S31 L04_FINAL PACKET	.pdf	9/29/2015	Construction Jobsheets
WELLS RANCH USX AE T6N-R62W-S31 L04_COMPLETED TLO	.pdf	2/10/2017	Truck Loadout Packet

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L04_WALKDOWN	.pdf	9/29/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L04_IR VERIFICATION	.pdf	9/25/2015	IR Verification Field Data Sheet
WELLS RANCH USX AE T6N-R62W-S31 L04_0279_NORMAL	.mp4	9/24/2015	IR Camera Video Normal Operations
WELLS RANCH USX AE T6N-R62W-S31 L04_0280_DUMP	.mp4	9/24/2015	IR Camera Video During Dump Event
WELLS RANCH USX AE T6N-R62W-S31 L04_0281_POST	.mp4	9/24/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX AE T6N-R62W-S31 L04_SIGNED EVAL	.pdf	1/3/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX AE T6N-R62W-S31 L04**

**Consent Decree Tank System Number:** **339**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>4</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,751</b>	<b>15,753</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,671</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>78,208</b>	<b>78,208</b>	
Total VCS Capacity (scfh)	<b>81,879</b>	<b>84,750</b>	
VCS Capacity minus PPIVF (scfh)	<b>66,128</b>	<b>68,997</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 7/30/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 10/12/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L04**

Consent Decree Tank System Number: **339**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>23</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>951</b>	<b>951</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
Total	<b>15,753</b>	<b>15,751</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX AE T6N-R62W-S31 L04**

Consent Decree Tank System Number: **339**

**Audit Notes**

[Empty box for Audit Notes]

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S3 L02**

Consent Decree Tank System Number: **1463**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L02_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L02_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX BB T5N-R63W-S3 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L02_FINAL PACKET	.pdf	7/11/2018	Work Request
WELLS RANCH USX BB T5N-R63W-S3 L02_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L02_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L02_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
WELLS RANCH USX BB T5N-R63W-S3 L02_0513_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WELLS RANCH USX BB T5N-R63W-S3 L02_0514_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WELLS RANCH USX BB T5N-R63W-S3 L02_0515_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L02_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX BB T5N-R63W-S3 L02**

**Consent Decree Tank System Number:** **1463**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,083</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,496</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,083</b>	<b>2,083</b>	
Total VCS Capacity (scfh)	<b>5,579</b>	<b>6,683</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,497</b>	<b>2,600</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/6/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S3 L02**

Consent Decree Tank System Number: **1463**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	760							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	79.4							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,307	3,307
Oil Tank Working Rate	301	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
<b>Total</b>	<b>4,083</b>	<b>4,082</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S3 L02**

Consent Decree Tank System Number: **1463**

**Audit Notes**

[Empty box for Audit Notes]

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S3 L03**

Consent Decree Tank System Number: **1455**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L03_FINAL PACKET	.pdf	12/22/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L03_STEM Engineering Evaluation_rev1	.xlsm	6/28/2017	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX BB T5N-R63W-S3 L03_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L03_FINAL PACKET	.pdf	12/22/2015	Work Request
WELLS RANCH USX BB T5N-R63W-S3 L03_FINAL PACKET	.pdf	12/22/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L03_WALKDOWN	.pdf	12/22/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L03_IR VERIFICATION	.pdf	12/18/2015	IR Verification Field Data Sheet
WELLS RANCH USX BB T5N-R63W-S3 L03_0517_NORMAL	.mp4	8/27/2018	IR Camera Video Normal Operations
WELLS RANCH USX BB T5N-R63W-S3 L03_0518_DUMP	.mp4	8/27/2018	IR Camera Video During Dump Event
WELLS RANCH USX BB T5N-R63W-S3 L03_0519_POST	.mp4	8/27/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S3 L03_SIGNED EVAL	.pdf	7/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX BB T5N-R63W-S3 L03**

**Consent Decree Tank System Number:** **1455**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,552</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,997</b>	<b>1,997</b>	
Total VCS Capacity (scfh)	<b>5,549</b>	<b>6,597</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,868</b>	<b>2,772</b>	

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/28/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 11/12/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S3 L03**

Consent Decree Tank System Number: **1455**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_T$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_T$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_T$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>l</sup>	<b>238</b>	
Mscfd	<b>11</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
Total	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S3 L03**

Consent Decree Tank System Number: **1455**

**Audit Notes**

The walkdown checklist (WELLS RANCH USX BB T5N-R63W-S3 L03\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (WELLS RANCH USX BB T5N-R63W-S3 L03\_FINAL PACKET).

The STEM work request (WELLS RANCH USX BB T5N-R63W-S3 L03\_FINAL PACKET, p 3) requests that a new D-grade LP Separator be installed on the site. The Job sheet (WELLS RANCH USX BB T5N-R63W-S3 L03\_FINAL PACKET, p 22) confirms a new 270# LP separator was installed on the site. A1 from the walkdown checklist (WELLS RANCH USX BB T5N-R63W-S3 L03\_WALKDOWN, p 1) was used to confirm the trim is 1/2". There was no documentation to confirm the valve size, therefore a 2" valve size was used in the model to be conservative. It is unknown if the modeling guideline was strictly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX BB T5N-R63W-S15 L02**

**Consent Decree Tank System Number:** **1529**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L02_FINAL PACKET	.pdf	5/11/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L02_STEM Engineering Evaluation_rev1	.xlsm	5/16/2016	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX BB T5N-R63W-S15 L02_SIGNED EVAL	.pdf	5/18/2016	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L02_FINAL PACKET	.pdf	5/11/2016	Work Request
WELLS RANCH USX BB T5N-R63W-S15 L02_FINAL PACKET	.pdf	5/11/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L02_WALKDOWN	.pdf	5/11/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L02_IR VERIFICATION	.pdf	5/10/2016	IR Verification Field Data Sheet
WELLS RANCH USX BB T5N-R63W-S15 L02_0954_NORMAL	.mp4	5/9/2016	IR Camera Video Normal Operations
WELLS RANCH USX BB T5N-R63W-S15 L02_0955_DUMP	.mp4	5/9/2016	IR Camera Video During Dump Event
WELLS RANCH USX BB T5N-R63W-S15 L02_0957_POST	.mp4	5/9/2016	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L02_SIGNED EVAL	.pdf	5/18/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX BB T5N-R63W-S15 L02**

**Consent Decree Tank System Number:** **1529**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No

VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>1,035</b>	<b>123</b>	
Total VCS Capacity (scfh)	<b>5,216</b>	<b>4,723</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,535</b>	<b>898</b>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by:	Davis Neeper
Audit Document Review Date:	12/11/2018
Audit Document Review Verified by:	Angela M. Oberlander
Audit Document Verification Date:	12/18/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S15 L02**

Consent Decree Tank System Number: **1529**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S15 L02**

Consent Decree Tank System Number: **1529**

**Audit Notes**

A new LP separator was brought on-site to develop a HP-LP train. Could not verify the oil dump valve size (2" or 1") of the new LP separator. Conservatively assumed the valve to be 2", the larger available size for 1/2" trim.

It is unknown whether the Modeling Guidance was correctly applied with an unconfirmed valve body size.

The STEM Work Request indicated the 2" VOC line on the top of the oil storage tanks to the KO pot was to be replaced with a 3" line. There is no confirmation the piping modification occurred. The Engineering Evaluation was completed with a 3" NPS for this section of pipe.

Noble provided information on 12/10/2018 indicating a "Field verification for this facility was completed on or around 4/12/2016, field verification confirmed that the 3" VOC line from the tank to the KO was installed." The Engineering Design Standard was appropriately applied based on the provided field verification information.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S15 L04**

Consent Decree Tank System Number: **1387**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L04_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L04_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX BB T5N-R63W-S15 L04_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L04_FINAL PACKET	.pdf	7/11/2018	Work Request
WELLS RANCH USX BB T5N-R63W-S15 L04_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L04_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L04_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
WELLS RANCH USX BB T5N-R63W-S15 L04_0960_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WELLS RANCH USX BB T5N-R63W-S15 L04_0961_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WELLS RANCH USX BB T5N-R63W-S15 L04_0962_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L04_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX BB T5N-R63W-S15 L04**

**Consent Decree Tank System Number:** **1387**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>1</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,444</b>	<b>3,445</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,220</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>293</b>	<b>293</b>	
Total VCS Capacity (scfh)	<b>4,513</b>	<b>4,893</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,069</b>	<b>1,448</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Ryan Bell  
 Audit Document Review Date: 7/16/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 8/6/2018





**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S15 L04**

Consent Decree Tank System Number: **1387**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.61							
Z2	-0.86							
Z3	0.98							
Z	0.72							
Gas/Oil Ratio (scf/bbl)	96.4							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	530							
Vapor Pressure (psia) <sup>c</sup>	73							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.86							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	727							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	70.1							
Working Flow (Mscfd) <sup>h,i</sup>	7							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	6	0

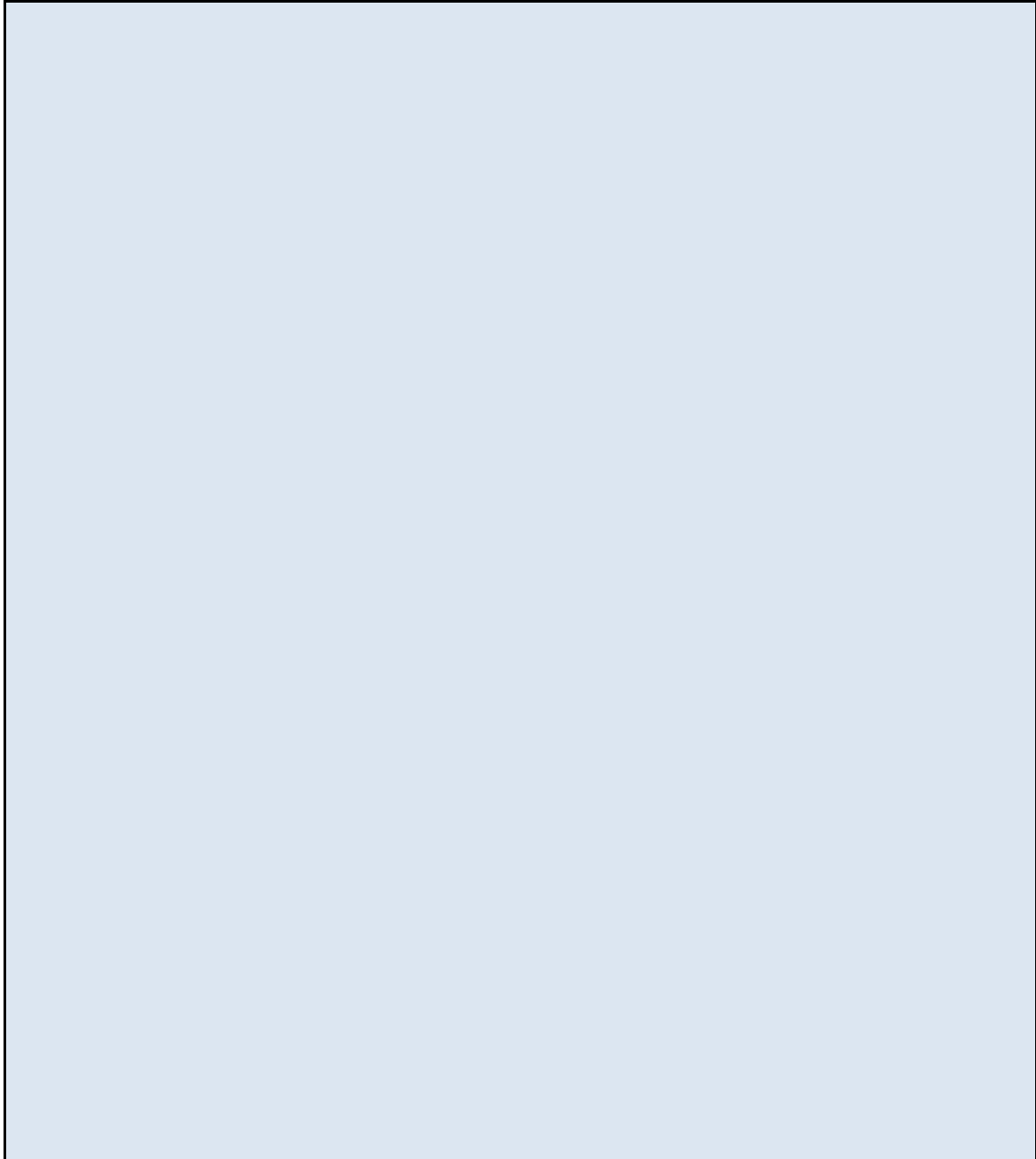
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	2,919	2,919
Oil Tank Working Rate	288	287
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	238	238
Truck Loading Vapor	0	0
<b>Total</b>	<b>3,445</b>	<b>3,444</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S15 L04**

Consent Decree Tank System Number: **1387**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S15 L06**

Consent Decree Tank System Number: **332**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L06_FINAL PACKET	.pdf	10/30/2015	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L06_STEM Engineering Evaluation_rev1	.xlsm	6/23/2017	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX BB T5N-R63W-S15 L06_SIGNED EVAL	.pdf	7/21/2017	Final Signed Engineering Evaluation
2018 Draft Attachments to Comment Letter	.pdf	3/27/2020	Additional Engineering Evaluation Information

Modification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L06_FINAL PACKET	.pdf	10/30/2015	Work Request
WELLS RANCH USX BB T5N-R63W-S15 L06_FINAL PACKET	.pdf	10/30/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L06_WALKDOWN	.pdf	10/30/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L06_IR VERIFICATION	.pdf	10/28/2015	IR Verification Field Data Sheet
WELLS RANCH USX BB T5N-R63W-S15 L06_0395_NORMAL	.mp4	10/27/2015	IR Camera Video Normal Operations
WELLS RANCH USX BB T5N-R63W-S15 L06_0396_DUMP	.mp4	10/27/2015	IR Camera Video During Dump Event
WELLS RANCH USX BB T5N-R63W-S15 L06_0397_POST	.mp4	10/27/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX BB T5N-R63W-S15 L06_SIGNED EVAL	.pdf	7/21/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WELLS RANCH USX BB T5N-R63W-S15 L06  
**Consent Decree Tank System Number:** 332

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>6</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,513</b>	<b>16,228</b>	<b>5%</b>
Calculated Burner Capacity (scfh)	<b>2,916</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>72,414</b>	<b>72,414</b>	
Total VCS Capacity (scfh)	<b>75,330</b>	<b>78,247</b>	
VCS Capacity minus PPIVF (scfh)	<b>59,817</b>	<b>62,019</b>	

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neepser  
 Audit Document Review Date: 8/31/2018  
 Audit Document Review Verified by: Angela M. Oberlander & James Van Horne  
 Audit Document Verification Date: 10/3/2018 & 8/17/2020



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S15 L06**

Consent Decree Tank System Number: **332**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>34</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,426</b>	<b>713</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>16,228</b>	<b>15,513</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX BB T5N-R63W-S15 L06**

Consent Decree Tank System Number: **332**

**Audit Notes**

The Engineering Evaluation did not include breathing losses from the non-production accepting tank bank. The facility configuration has two banks - one bank with three (3) oil tanks, and another bank with three (3) oil tanks. By excluding the breathing losses from the non-production accepting bank which continues to store oil, the correct application of the Modeling Guidelines cannot be verified.

The Engineering Evaluation was provided for the tank bank with two production accepting tanks and the TLO headspace tank. The other bank has three production accepting tanks. Noble provided additional information in a letter dated 3/27/2020 explaining that the headspace tank is used for both banks due to the way the piping and valving is set up.

The Work Request indicated the PSHH for the LP Separators was to be set to 70 psig triggering a wellhead shut-in. There is no confirmation in the provided documentation that the setpoint was implemented for the LP separator. The Automation QC Form only indicates the Compressor ESD was verified.

Can not verify the Modeling Guidelines have been correctly applied.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX T6N-R62W-S29 L01**

Consent Decree Tank System Number: **1619**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX T6N-R62W-S29 L01_FINAL PACKET	.pdf	9/23/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX T6N-R62W-S29 L01_STEM Engineering Evaluation_rev1	.xlsm	1/24/2018	STEM Engineering Evaluation Spreadsheet
WELLS RANCH USX T6N-R62W-S29 L01_SIGNED EVAL	.pdf	1/24/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX T6N-R62W-S29 L01_FINAL PACKET	.pdf	9/23/2015	Work Request
WELLS RANCH USX T6N-R62W-S29 L01_FINAL PACKET	.pdf	9/23/2015	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX T6N-R62W-S29 L01_WALKDOWN	.pdf	9/22/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX T6N-R62W-S29 L01_IR VERIFICATION	.pdf	9/22/2015	IR Verification Field Data Sheet
WELLS RANCH USX T6N-R62W-S29 L01_0294_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WELLS RANCH USX T6N-R62W-S29 L01_0295_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WELLS RANCH USX T6N-R62W-S29 L01_0296_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WELLS RANCH USX T6N-R62W-S29 L01_SIGNED EVAL	.pdf	1/24/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WELLS RANCH USX T6N-R62W-S29 L01**

**Consent Decree Tank System Number:** **1619**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>300</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/4"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>19,409</b>	<b>19,410</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,888</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>22,029</b>	<b>22,029</b>	
Total VCS Capacity (scfh)	<b>25,917</b>	<b>28,571</b>	
VCS Capacity minus PPIVF (scfh)	<b>6,508</b>	<b>9,160</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/24/2018 & 12/13/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 12/14/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX T6N-R62W-S29 L01**

Consent Decree Tank System Number: **1619**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	2.19							
Z2	-0.86							
Z3	0.98							
Z	2.31							
Gas/Oil Ratio (scf/bbl)	780.9							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.55							
Valve Coefficient (gpm/psi) ( $C_v$ )	2.96							
Critical Pressure (psia) <sup>b</sup>	744							
Vapor Pressure (psia) <sup>c</sup>	313							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.78							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	568							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	443.3							
Working Flow (Mscfd) <sup>h,i</sup>	5							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	17	0

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	18,472	18,472
Oil Tank Working Rate	225	224
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	713	713
Truck Loading Vapor	0	0
Total	19,410	19,409

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WELLS RANCH USX T6N-R62W-S29 L01**

Consent Decree Tank System Number: **1619**

**Audit Notes**

**Vapor Surge Vessel**

Noble confirmed via data request received on 12/10/2018 that field verification for this facility was completed on or around 9/30/2015 and that it was confirmed that one (1) tank was converted to a headspace tank.

**Oil Dump Valve Size - Unknown**

Jobsheet (Final Packet, pg 18) indicates a new separator was installed onsite and also indicates a 1/4" oil dump trim was installed in the separator. No documentation is provided to indicate the oil dump valve size installed in the separator onsite.

A 2" oil dump valve is used in the Engineering Evaluation, no documentation is provided to confirm this valve was/is installed on the HP separator. For the given trim size, 1/4", a 2" valve is the largest that could be installed (most conservative) and therefore the modeling guideline can be confirmed as being followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WERNING T4N-R88W-S2-L01**

Consent Decree Tank System Number: **197**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WERNING T4N-R88W-S2 L01_FINAL PACKET	.pdf	8/9/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WERNING T4N-R88W-S2 L01_STEM Engineering Evaluation_rev1	.xlsm	8/15/2016	STEM Engineering Evaluation Spreadsheet
WERNING T4N-R88W-S2 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WERNING T4N-R88W-S2 L01_FINAL PACKET	.pdf	8/9/2016	Work Request
WERNING T4N-R88W-S2 L01_FINAL PACKET	.pdf	8/9/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WERNING T4N-R88W-S2 L01_FINAL PACKET	.pdf	8/9/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WERNING T4N-R88W-S2 L01_IR VERIFICATION	.pdf	8/5/2016	IR Verification Field Data Sheet
WERNING T4N-R88W-S2 L01_1358_NORMAL	.mp4	8/3/2016	IR Camera Video Normal Operations
WERNING T4N-R88W-S2 L01_1358_DUMP	.mp4	8/3/2016	IR Camera Video During Dump Event
WERNING T4N-R88W-S2 L01_1358_POST	.mp4	8/3/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WERNING T4N-R88W-S2 L01_SIGNED EVAL	.pdf	8/22/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WERNING T4N-R88W-S2-L01**

Consent Decree Tank System Number: **197**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,646</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>17,504</b>	<b>17,504</b>	
Total VCS Capacity (scfh)	<b>20,150</b>	<b>23,337</b>	
VCS Capacity minus PPIVF (scfh)	<b>15,404</b>	<b>18,590</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Alex Asbury  
 Audit Document Review Date: 12/11/2017  
 Audit Document Review Verified by: Nick Michaelson  
 Audit Document Verification Date: 4/23/2018

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WERNING T4N-R88W-S2-L01**

Consent Decree Tank System Number: **197**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>r</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WERNING T4N-R88W-S2-L01**

Consent Decree Tank System Number: **197**

**Audit Notes**

**1. Field Datasheets**

The Field Datasheets (Final Packet, pg 23-29) are not dated. Assumed the date is the same as Facility Scouting date (12/4/2015).

**2. Facility walkdown checklist inconsistency**

Item C13 of the Walkdown Checklist (Final Packet, pg 17) is marked "yes" indicating the LP separator can produce into all tanks. The Stem Work Request (Final Packet, pg 5) and Job Sheet (Final Packet, pg 41) indicate one tank is disconnected from the oil fill line and serves as a headspace-only tank.

Given this inconsistency, the Walkdown Checklist has not been used as confirmation of changes on site.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WERTZ FED T4N-R66W-S12 L01**

Consent Decree Tank System Number: **116**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WERTZ FED T4N-R66W-S12 L01_FINAL PACKET	.pdf	1/16/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WERTZ FED T4N-R66W-S12 L01_STEM Engineering Evaluation_rev1	.xlsm	1/16/2017	STEM Engineering Evaluation Spreadsheet
WERTZ FED T4N-R66W-S12 L01_SIGNED EVAL	.pdf	1/16/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WERTZ FED T4N-R66W-S12 L01_FINAL PACKET	.pdf	1/16/2017	Work Request
WERTZ FED T4N-R66W-S12 L01_FINAL PACKET	.pdf	1/16/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WERTZ FED T4N-R66W-S12 L01_WALKDOWN	.pdf	1/16/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WERTZ FED T4N-R66W-S12 L01_IR VERIFICATION	.pdf	1/16/2017	IR Verification Field Data Sheet
WERTZ FED T4N-R66W-S12 L01_1255_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WERTZ FED T4N-R66W-S12 L01_1256_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WERTZ FED T4N-R66W-S12 L01_1257_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WERTZ FED T4N-R66W-S12 L01_SIGNED EVAL	.pdf	1/16/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WERTZ FED T4N-R66W-S12 L01**

Consent Decree Tank System Number: **116**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>65</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,082</b>	<b>4,244</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>4,181</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>19,933</b>	<b>19,933</b>	
Total VCS Capacity (scfh)	<b>24,114</b>	<b>25,766</b>	
VCS Capacity minus PPIVF (scfh)	<b>20,032</b>	<b>21,523</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 7/18/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 11/12/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WERTZ FED T4N-R66W-S12 L01**

Consent Decree Tank System Number: **116**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	0.69							
Z2	-0.86							
Z3	0.98							
Z	0.81							
Gas/Oil Ratio (scf/bbl)	104.5							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.78							
Valve Coefficient (gpm/psi) ( $C_v$ )	7.20							
Critical Pressure (psia) <sup>b</sup>	535							
Vapor Pressure (psia) <sup>c</sup>	78							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.85							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	794							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	82.9							
Working Flow (Mscfd) <sup>h,i</sup>	8							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	
scfh vapor/tank <sup>i</sup>	238	
Mscfd	11	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	3,454	3,307
Oil Tank Working Rate	314	300
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	4,244	4,082

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WERTZ FED T4N-R66W-S12 L01**

Consent Decree Tank System Number: **116**

**Audit Notes**

The walkdown checklist (WERTZ FED T4N-R66W-S12 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documents in the final packet (WERTZ FED T4N-R66W-S12 L01\_FINAL PACKET).

The STEM work request document (WERTZ FED T4N-R66W-S12 L01\_FINAL PACKET, p 3) requests that the existing Cimarron 30" combustor be replaced with a B-grade tank burner to be connected to the tank VOC header. The removed equipment form (WERTZ FED T4N-R66W-S12 L01\_FINAL PACKET, p 22) confirms the 30" Cimarron was removed from the site and a Tornado 48" tank burner was installed on 12/2/2016. However, the job sheet (WERTZ FED T4N-R66W-S12 L01\_FINAL PACKET, p 21) states that a 48" LEED was installed on 12/8/2016 when the 30" Cimarron was removed. The signed evaluation (WERTZ FED T4N-R66W-S12 L01\_SIGNED EVAL, p 2) and model (WERTZ FED T4N-R66W-S12 L01\_STEM Engineering Evaluation\_rev1) were both run using the 48" Tornado burner. The 48" Leed has a higher capacity than a 48" Tornado. The facility has an actual burner capacity that is greater than the model. Therefore the engineering design standard is still strictly followed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WEST IRRIGATION USX T7N-R64W-S33 L01**

Consent Decree Tank System Number: **605**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WEST IRRIGATION USX T7N-R64W-S33 L01_FINAL PACKET	.pdf	1/14/2016	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WEST IRRIGATION USX T7N-R64W-S33 L01_STEM Engineering Evaluation_rev1	.xlsm	11/17/2017	STEM Engineering Evaluation Spreadsheet
WEST IRRIGATION USX T7N-R64W-S33 L01_SIGNED EVAL	.pdf	12/11/2017	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WEST IRRIGATION USX T7N-R64W-S33 L01_FINAL PACKET	.pdf	1/14/2016	Work Request
WEST IRRIGATION USX T7N-R64W-S33 L01_FINAL PACKET	.pdf	1/14/2016	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WEST IRRIGATION USX T7N-R64W-S33 L01_WALKDOWN	.pdf	1/13/2016	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WEST IRRIGATION USX T7N-R64W-S33 L01_IR VERIFICATION	.pdf	1/13/2016	IR Verification Field Data Sheet
WEST IRRIGATION USX T7N-R64W-S33 L01_0592_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WEST IRRIGATION USX T7N-R64W-S33 L01_0593_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WEST IRRIGATION USX T7N-R64W-S33 L01_0594_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WEST IRRIGATION USX T7N-R64W-S33 L01_SIGNED EVAL	.pdf	12/11/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** WEST IRRIGATION USX T7N-R64W-S33 L01

**Consent Decree Tank System Number:** 605

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	3
Oil Tank Capacity (bbl):	300
# of Water Tanks:	0
Water Tank Capacity (bbl):	0
VOC Line Size Tanks to KO (in):	3"
# VOC Lines Tanks to KO:	1
VOC Line Size KO to Burner (in):	3"
# VOC Lines KO to Burner:	1

Oil	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	70							
Dump Valve Size & Trim Size (in)	1" & 1/2"							

Water	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	LEED EC48-2S			
Number of Units	1			
Man. Capacity (MSCFD)	119			

	Noble	SLR	Percent Difference
Calculated PPIVF (scfh)	4,746	4,747	0%
Calculated Burner Capacity (scfh)	3,898	4,958	
Headspace Surge Capacity (scfh)	3,803	3,803	
Total VCS Capacity (scfh)	7,701	8,761	
VCS Capacity minus PPIVF (scfh)	2,955	4,014	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/24/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/27/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WEST IRRIGATION USX T7N-R64W-S33 L01**

Consent Decree Tank System Number: **605**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WEST IRRIGATION USX T7N-R64W-S33 L01**

Consent Decree Tank System Number: **605**

**Audit Notes**

**Oil Dump Valve Size**

The Jobsheets (Final Packet, pg 22) indicate one of the existing separators on site was converted to LP separator. The field data sheets (Final Packet, pg 14) show both existing separators had 1" valve body size. Item A1 of the STEM Walkdown Checklist (Final Packet, pg 5) is checked "yes" indicating the oil dump trim is consistent with the Engineering Evaluation, and is therefore 1/2". Both the oil body dump valve and trim size are therefore confirmed.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILKINSON T6N-R65W-S1 L01**

Consent Decree Tank System Number: **1771**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WILKINSON T6N-R65W-S1 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WILKINSON T6N-R65W-S1 L01_STEM Engineering Evaluation_rev1	.xlsm	7/24/2018	STEM Engineering Evaluation Spreadsheet
WILKINSON T6N-R65W-S1 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WILKINSON T6N-R65W-S1 L01_FINAL PACKET	.pdf	7/11/2018	Work Request
WILKINSON T6N-R65W-S1 L01_FINAL PACKET	.pdf	7/11/2018	Construction Jobsheets

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WILKINSON T6N-R65W-S1 L01_WALKDOWN	.pdf	7/11/2018	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WILKINSON T6N-R65W-S1 L01_IR VERIFICATION	.pdf	7/11/2018	IR Verification Field Data Sheet
WILKINSON T6N-R65W-S1 L01_0057_NORMAL	.mp4	7/11/2018	IR Camera Video Normal Operations
WILKINSON T6N-R65W-S1 L01_0058_DUMP	.mp4	7/11/2018	IR Camera Video During Dump Event
WILKINSON T6N-R65W-S1 L01_0059_POST	.mp4	7/11/2018	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WILKINSON T6N-R65W-S1 L01_SIGNED EVAL	.pdf	7/11/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WILKINSON T6N-R65W-S1 L01**

**Consent Decree Tank System Number:** **1771**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>3"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>60</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>3,681</b>	<b>3,825</b>	<b>4%</b>
Calculated Burner Capacity (scfh)	<b>3,998</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>1,926</b>	<b>2,061</b>	
Total VCS Capacity (scfh)	<b>5,924</b>	<b>7,019</b>	
VCS Capacity minus PPIVF (scfh)	<b>2,243</b>	<b>3,194</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/23/2018  
 Audit Document Review Verified by: Chris Boggess  
 Audit Document Verification Date: 9/28/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILKINSON T6N-R65W-S1 L01**

Consent Decree Tank System Number: **1771**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.61</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.72</b>							
Gas/Oil Ratio (scf/bbl)	<b>96.4</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.78</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>7.20</b>							
Critical Pressure (psia) <sup>b</sup>	<b>530</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>73</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.86</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>759</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>73.2</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>7</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,049</b>	<b>2,919</b>
Oil Tank Working Rate	<b>301</b>	<b>287</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>3,825</b>	<b>3,681</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILKINSON T6N-R65W-S1 L01**

Consent Decree Tank System Number: **1771**

**Audit Notes**

No Audit Notes

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILMOTH T4N-R64W-S5 L01**

Consent Decree Tank System Number: **617**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S5 L01_FINAL PACKET	.pdf	3/27/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S5 L01_STEM Engineering Evaluation_rev1	.xlsm	4/25/2016	STEM Engineering Evaluation Spreadsheet
WILMOTH T4N-R64W-S5 L01_Final Signed STEM Plan	.pdf	6/9/2016	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S5 L01_FINAL PACKET	.pdf	3/27/2018	Work Request
WILMOTH T4N-R64W-S5 L01_FINAL PACKET	.pdf	3/27/2018	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S5 L01_WALKDOWN	.pdf	4/15/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S5 L01_IR VERIFICATION	.pdf	4/14/2016	IR Verification Field Data Sheet
WILMOTH T4N-R64W-S5 L01_0848_NORMAL	.mp4	4/12/2016	IR Camera Video Normal Operations
WILMOTH T4N-R64W-S5 L01_0849_DUMP	.mp4	4/12/2016	IR Camera Video During Dump Event
WILMOTH T4N-R64W-S5 L01_0850_POST	.mp4	4/12/2016	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S5 L01_SIGNED EVAL	.pdf	4/25/2016	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WILMOTH T4N-R64W-S5 L01**

**Consent Decree Tank System Number:** **617**

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,508</b>	<b>4,509</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,089</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>2,150</b>	<b>2,150</b>	
Total VCS Capacity (scfh)	<b>6,239</b>	<b>6,750</b>	
VCS Capacity minus PPIVF (scfh)	<b>1,731</b>	<b>2,241</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: CHRIS BOGGESS  
 Audit Document Review Date: 5/14/2018  
 Audit Document Review Verified by: Craig Bock  
 Audit Document Verification Date: 9/21/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILMOTH T4N-R64W-S5 L01**

Consent Decree Tank System Number: **617**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor	<b>0.94</b>							
Valve Coefficient (gpm/psi) (C <sub>v</sub> )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor								
Valve Coefficient (gpm/psi) (C <sub>v</sub> )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio (F <sub>F</sub> ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>11</b>	

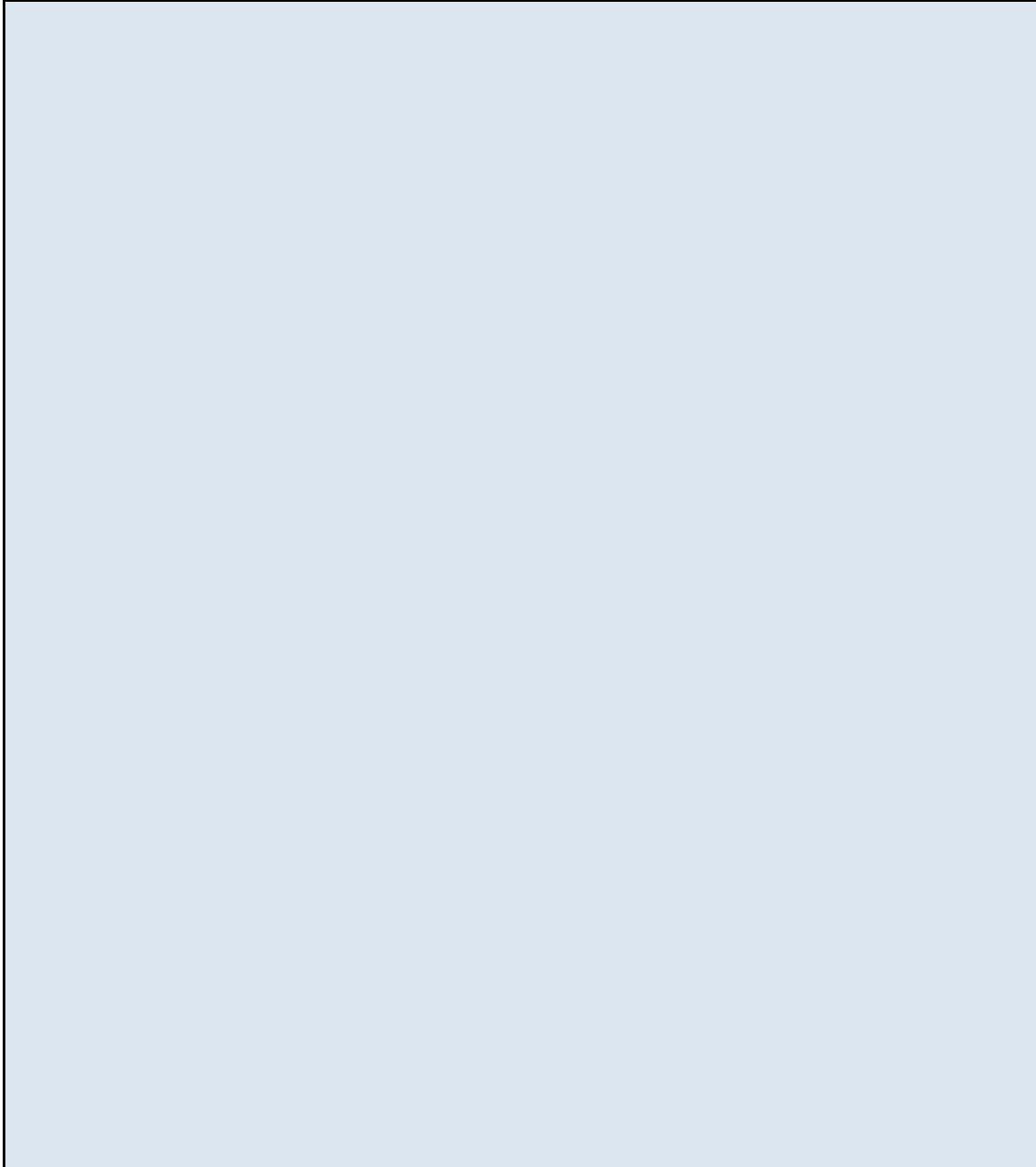
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,509</b>	<b>4,508</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILMOTH T4N-R64W-S5 L01**

Consent Decree Tank System Number: **617**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILMOTH T4N-R64W-S14 L03**

Consent Decree Tank System Number: **816/1438**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_FINAL PACKET	.pdf	3/20/2017	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_STEM Engineering Evaluation_rev1	.xlsm	3/20/2017	STEM Engineering Evaluation Spreadsheet
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_SIGNED EVAL	.pdf	3/23/2017	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_FINAL PACKET	.pdf	3/20/2017	Work Request
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_FINAL PACKET	.pdf	3/20/2017	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_WALKDOWN	.pdf	3/20/2017	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_IR VERIFICATION	.pdf	3/27/2018	IR Verification Field Data Sheet
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_1856_NORMAL	.mp4	3/14/2017	IR Camera Video Normal Operations
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_1857_DUMP	.mp4	3/14/2017	IR Camera Video During Dump Event
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_1858_POST	.mp4	3/14/2017	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WILMOTH T4N-R64W-S14 L03 & WILMOTH T4N-R64W-S14 L04_SIGNED EVAL	.pdf	3/23/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WILMOTH T4N-R64W-S14 L03**

**Consent Decree Tank System Number:** **816/1438**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>120</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED EC48-2S</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>119</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>10,346</b>	<b>10,348</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,483</b>	<b>4,958</b>	
Headspace Surge Capacity (scfh)	<b>23,999</b>	<b>23,999</b>	
Total VCS Capacity (scfh)	<b>27,482</b>	<b>28,957</b>	
VCS Capacity minus PPIVF (scfh)	<b>17,136</b>	<b>18,610</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Davis Neeper  
 Audit Document Review Date: 6/8/2018  
 Audit Document Review Verified by: Angela M. Oberlander  
 Audit Document Verification Date: 8/9/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILMOTH T4N-R64W-S14 L03**

Consent Decree Tank System Number: **816/1438**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	1.34							
Z2	-0.86							
Z3	0.98							
Z	1.46							
Gas/Oil Ratio (scf/bbl)	209.8							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	0.94							
Valve Coefficient (gpm/psi) ( $C_v$ )	5.72							
Critical Pressure (psia) <sup>b</sup>	584							
Vapor Pressure (psia) <sup>c</sup>	133							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	0.83							
Choked Flow? <sup>e</sup>	Yes							
Peak Flow (bopd) <sup>f,g</sup>	1080							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	226.7							
Working Flow (Mscfd) <sup>h,i</sup>	10							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	300	0
scfh vapor/tank <sup>i</sup>	238	0
Mscfd	11	0

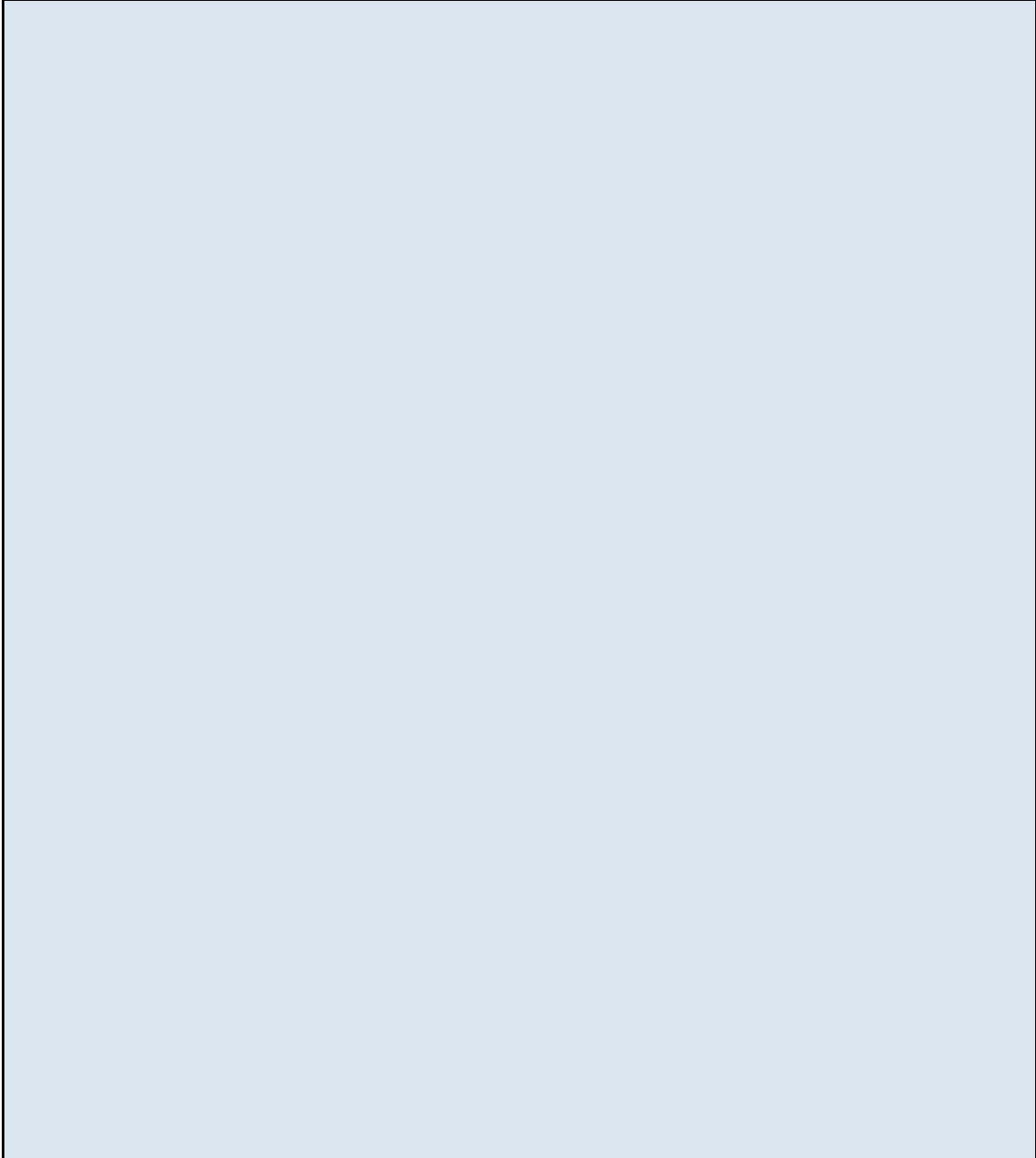
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	SLR	Noble
Oil Tank Flash Rate	9,444	9,444
Oil Tank Working Rate	428	427
Water Tank Flash Rate	0	0
Water Tank Working Rate	0	0
Tank Breathing Rate	475	475
Truck Loading Vapor	0	0
Total	10,348	10,346

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILMOTH T4N-R64W-S14 L03**

Consent Decree Tank System Number: **816/1438**

**Audit Notes**

A large, empty rectangular box with a black border, intended for entering audit notes. The interior of the box is light blue.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILSON T7N-R63W-S20 L01**

Consent Decree Tank System Number: **1921**

**Tank Systems Engineering Design Standard Documents Reviewed**

*Vapor Control System Engineering Design Pre-Evaluation Documents*

File Name	File Ext.	File Date	Document Description
WILSON T7N-R63W-S20 L01_FINAL PACKET	.pdf	11/2/2015	Pre-Evaluation Facility Inspection

*Vapor Control System Engineering Evaluation Documents:*

File Name	File Ext.	File Date	Document Description
WILSON T7N-R63W-S20 L01_STEM Engineering Evaluation_rev1	.xlsm	7/11/2018	STEM Engineering Evaluation Spreadsheet
WILSON T7N-R63W-S20 L01_SIGNED EVAL	.pdf	7/24/2017	Final Signed Engineering Evaluation
WILSON T7N-R63W-S20 L01_REWORK	.pdf	6/26/2017	Rework Evaluation

*Modification Documents:*

File Name	File Ext.	File Date	Document Description
WILSON T7N-R63W-S20 L01_FINAL PACKET	.pdf	11/2/2015	Work Request
WILSON T7N-R63W-S20 L01_FINAL PACKET	.pdf	11/2/2015	Construction Jobsheets
WILSON T7N-R63W-S20 L01_REWORK	.pdf	6/26/2017	Rework Evaluation

*Facility Walk Down Documents:*

File Name	File Ext.	File Date	Document Description
WILSON T7N-R63W-S20 L01_WALKDOWN	.pdf	10/29/2015	Final Facility Walkdown Checklist

*Vapor Control System Verification Documents:*

File Name	File Ext.	File Date	Document Description
WILSON T7N-R63W-S20 L01_IR VERIFICATION	.pdf	10/29/2015	IR Verification Field Data Sheet
WILSON T7N-R63W-S20 L01_0411_NORMAL	.mp4	10/29/2015	IR Camera Video Normal Operations
WILSON T7N-R63W-S20 L01_0412_DUMP	.mp4	10/29/2015	IR Camera Video During Dump Event
WILSON T7N-R63W-S20 L01_0413_POST	.mp4	10/29/2015	IR Camera Video Post Dump Event

*Facility Engineering Sign-Off Documents:*

File Name	File Ext.	File Date	Document Description
WILSON T7N-R63W-S20 L01_SIGNED EVAL	.pdf	7/24/2017	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILSON T7N-R63W-S20 L01**

Consent Decree Tank System Number: **1921**

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

*VCS Engineering Evaluation verified inputs:*

# of Oil Tanks:	<b>2</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>250</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 3/16"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>COMM 200 48"</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>157</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>7,415</b>	<b>7,415</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>4,066</b>	<b>6,542</b>	
Headspace Surge Capacity (scfh)	<b>7,742</b>	<b>7,742</b>	
Total VCS Capacity (scfh)	<b>11,808</b>	<b>14,284</b>	
VCS Capacity minus PPIVF (scfh)	<b>4,393</b>	<b>6,868</b>	

<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Tom Kussard  
 Audit Document Review Date: 7/23/2018 & 12/13/2018  
 Audit Document Review Verified by: Kenny Malmquist  
 Audit Document Verification Date: 12/14/2018



**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILSON T7N-R63W-S20 L01**

Consent Decree Tank System Number: **1921**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>2.04</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>2.15</b>							
Gas/Oil Ratio (scf/bbl)	<b>589.0</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.59</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>1.51</b>							
Critical Pressure (psia) <sup>b</sup>	<b>700</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>263</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.79</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>278</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>163.9</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>3</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>11</b>	<b>0</b>

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>6,830</b>	<b>6,830</b>
Oil Tank Working Rate	<b>110</b>	<b>110</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>475</b>	<b>475</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>7,415</b>	<b>7,415</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WILSON T7N-R63W-S20 L01**

Consent Decree Tank System Number: **1921**

**Audit Notes**

**1. Field Datasheets are not dated**

The Field Datasheets (Final Packet, pg 4-9) are not dated. Date assumed to be same as Facility Scouting Date (8/13/2015).

**2. Vapor Surge Vessel Onsite - Request Confirmation**

Due to out of date of documentation (See audit note #2 above), SLR is not able to confirm a vapor surge vessel onsite

**Request confirmation of (1) 300bbl vapor surge vessel onsite.**

**UPDATE 12/13/2018 - Noble confirmed via data request that field verification for this site was completed on or around 7/10/2017 and confirms one (1) tank was converted to a headspace tank.**

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WPF CARLSON T6N-R64W-S18 L01**

Consent Decree Tank System Number: **606**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
WPF CARLSON T6N-R64W-S18 L01_FINAL PACKET	.pdf	7/11/2018	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
WPF CARLSON T6N-R64W-S18 L01_STEM Engineering Evaluation_rev1	.xlsm	1/10/2018	STEM Engineering Evaluation Spreadsheet
WPF CARLSON T6N-R64W-S18 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
WPF CARLSON T6N-R64W-S18 L01_FINAL PACKET	.pdf	8/13/2015	Work Request
WPF CARLSON T6N-R64W-S18 L01_FINAL PACKET	.pdf	10/6/2015	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
WPF CARLSON T6N-R64W-S18 L01_WALKDOWN	.pdf	10/20/2015	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
WPF CARLSON T6N-R64W-S18 L01_IR VERIFICATION	.pdf	10/20/2015	IR Verification Field Data Sheet
WPF CARLSON T6N-R64W-S18 L01_0362_NORMAL	.mp4	10/20/2015	IR Camera Video Normal Operations
WPF CARLSON T6N-R64W-S18 L01_0363_DUMP	.mp4	10/20/2015	IR Camera Video During Dump Event
WPF CARLSON T6N-R64W-S18 L01_0364_POST	.mp4	10/20/2015	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
WPF CARLSON T6N-R64W-S18 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** **WPF CARLSON T6N-R64W-S18 L01**

**Consent Decree Tank System Number:** **606**

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

**VCS Engineering Evaluation verified inputs:**

# of Oil Tanks:	<b>3</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	<b>0</b>
Water Tank Capacity (bbl):	<b>0</b>
VOC Line Size Tanks to KO (in):	<b>2"</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>4"</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>1" &amp; 1/2"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>TEC 4-CS (48" Tornado)</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>110.4</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>4,746</b>	<b>4,747</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>3,370</b>	<b>4,600</b>	
Headspace Surge Capacity (scfh)	<b>4,790</b>	<b>4,790</b>	
Total VCS Capacity (scfh)	<b>8,160</b>	<b>9,390</b>	
VCS Capacity minus PPIVF (scfh)	<b>3,414</b>	<b>4,643</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Leah Althoff  
 Audit Document Review Date: 8/2/2018  
 Audit Document Review Verified by: Patrick Dilsaver  
 Audit Document Verification Date: 9/4/2018





**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WPF CARLSON T6N-R64W-S18 L01**

Consent Decree Tank System Number: **606**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.94</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>5.72</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>792</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>89.3</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>8</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	<b>0</b>
scfh vapor/tank <sup>i</sup>	<b>238</b>	<b>0</b>
Mscfd	<b>17</b>	<b>0</b>

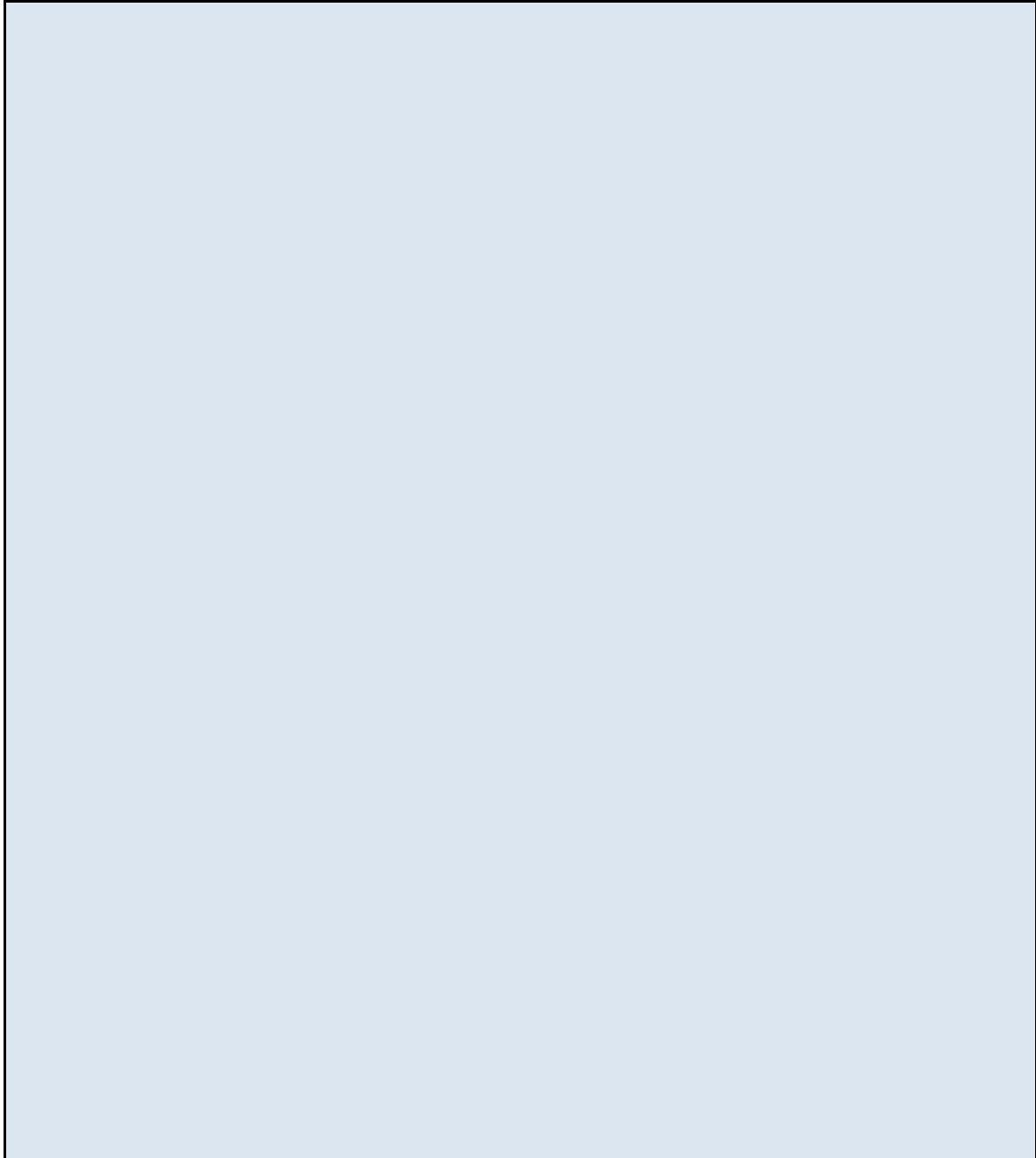
<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>3,720</b>	<b>3,720</b>
Oil Tank Working Rate	<b>314</b>	<b>313</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>713</b>	<b>713</b>
Truck Loading Vapor	<b>0</b>	<b>0</b>
<b>Total</b>	<b>4,747</b>	<b>4,746</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **WPF CARLSON T6N-R64W-S18 L01**

Consent Decree Tank System Number: **606**

**Audit Notes**

A large, empty rectangular box with a light blue gradient background and a black border, intended for entering audit notes.

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ZIGGY USX T7N-R64W-S19 L01**

Consent Decree Tank System Number: **1890**

**Tank Systems Engineering Design Standard Documents Reviewed**

Vapor Control System Engineering Design Pre-Evaluation Documents

File Name	File Ext.	File Date	Document Description
ZIGGY USX T7N-R64W-S19 L01_FINAL PACKET	.pdf	3/16/2016	Pre-Evaluation Facility Inspection

Vapor Control System Engineering Evaluation Documents:

File Name	File Ext.	File Date	Document Description
ZIGGY USX T7N-R64W-S19 L01_STEM Engineering Evaluation_rev1	.xlsm	6/12/2018	STEM Engineering Evaluation Spreadsheet
ZIGGY USX T7N-R64W-S19 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation

Modification Documents:

File Name	File Ext.	File Date	Document Description
ZIGGY USX T7N-R64W-S19 L01_FINAL PACKET	.pdf	3/16/2016	Work Request
ZIGGY USX T7N-R64W-S19 L01_FINAL PACKET	.pdf	3/16/2016	Construction Jobsheets

Facility Walk Down Documents:

File Name	File Ext.	File Date	Document Description
ZIGGY USX T7N-R64W-S19 L01_WALKDOWN	.pdf	3/16/2016	Final Facility Walkdown Checklist

Vapor Control System Verification Documents:

File Name	File Ext.	File Date	Document Description
ZIGGY USX T7N-R64W-S19 L01_IR VERIFICATION	.pdf	3/16/2016	IR Verification Field Data Sheet
ZIGGY USX T7N-R64W-S19 L01_0768_NORMAL	.mp4	8/27/2018	IR Camera Video Normal Operations
ZIGGY USX T7N-R64W-S19 L01_0769_DUMP	.mp4	8/27/2018	IR Camera Video During Dump Event
ZIGGY USX T7N-R64W-S19 L01_0770_POST	.mp4	8/27/2018	IR Camera Video Post Dump Event

Facility Engineering Sign-Off Documents:

File Name	File Ext.	File Date	Document Description
ZIGGY USX T7N-R64W-S19 L01_SIGNED EVAL	.pdf	1/12/2018	Final Signed Engineering Evaluation
ZIGGY USX T7N-R64W-S19 L01_COMPLETED TLO	.pdf	2/2/2017	Truck Loadout

**Engineering Evaluation Verification Audit**  
 Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

**LOD ID:** ZIGGY USX T7N-R64W-S19 L01

**Consent Decree Tank System Number:** 1890

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site Equipment/Emission Source Inventory Consistent Throughout Documentation?
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	VCS Engineering Evaluation includes applicable emissions sources?

VCS Engineering Evaluation verified inputs:

# of Oil Tanks:	<b>5</b>
Oil Tank Capacity (bbl):	<b>300</b>
# of Water Tanks:	
Water Tank Capacity (bbl):	
VOC Line Size Tanks to KO (in):	<b>3 "</b>
# VOC Lines Tanks to KO:	<b>1</b>
VOC Line Size KO to Burner (in):	<b>3 "</b>
# VOC Lines KO to Burner:	<b>1</b>

<b>Oil</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)	<b>70</b>							
Dump Valve Size & Trim Size (in)	<b>2" &amp; 1"</b>							

<b>Water</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Max Operating Pressure (psig)								
Dump Valve Size & Trim Size (in)								

VRT Installed?  Yes  No      Truck Loading Vapor Return Lines Installed?  Yes  No  
 VRT Shut in Pressure (psig)

	Model 1	Model 2	Model 3	Model 4
Tank Burner/ECD Model	<b>LEED 48" Gen 1 #7</b>			
Number of Units	<b>1</b>			
Man. Capacity (MSCFD)	<b>140</b>			

	<b>Noble</b>	<b>SLR</b>	<b>Percent Difference</b>
Calculated PPIVF (scfh)	<b>15,989</b>	<b>15,991</b>	<b>0%</b>
Calculated Burner Capacity (scfh)	<b>2,893</b>	<b>5,833</b>	
Headspace Surge Capacity (scfh)	<b>79,749</b>	<b>79,749</b>	
Total VCS Capacity (scfh)	<b>82,642</b>	<b>85,582</b>	
VCS Capacity minus PPIVF (scfh)	<b>66,653</b>	<b>69,592</b>	

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Modeling Guidance has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Engineering Design Standard has been correctly applied.
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Based on the Tank System Document Review, the Vapor Control System is adequately designed and sized to handle the Potential Peak Instantaneous Vapor Flow Rate (PPIVF).
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	This Tank System is selected for IR Camera Inspection.

Audit Document Review Performed by: Rachel Acker  
 Audit Document Review Date: 8/28/2018  
 Audit Document Review Verified by: James Van Horne  
 Audit Document Verification Date: 12/31/2018



**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ZIGGY USX T7N-R64W-S19 L01**

Consent Decree Tank System Number: **1890**

<b>Valko-McCain<sup>a</sup></b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Z1	<b>0.77</b>							
Z2	<b>-0.86</b>							
Z3	<b>0.98</b>							
Z	<b>0.89</b>							
Gas/Oil Ratio (scf/bbl)	<b>112.8</b>							

<b>Peak Oil Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )	<b>0.77</b>							
Valve Coefficient (gpm/psi) ( $C_v$ )	<b>21.25</b>							
Critical Pressure (psia) <sup>b</sup>	<b>539</b>							
Vapor Pressure (psia) <sup>c</sup>	<b>83</b>							
Critical pressure ratio ( $F_F$ ) <sup>d</sup>	<b>0.85</b>							
Choked Flow? <sup>e</sup>	<b>Yes</b>							
Peak Flow (bopd) <sup>f,g</sup>	<b>2409</b>							

<b>Oil Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)	<b>271.7</b>							
Working Flow (Mscfd) <sup>h,i</sup>	<b>23</b>							

<b>Peak Water Flow</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Valve Press Recovery Factor ( $C_f$ )								
Valve Coefficient (gpm/psi) ( $C_v$ )								
Critical Pressure (psia) <sup>j</sup>								
Vapor Pressure (psia) <sup>k</sup>								
Critical pressure ratio ( $F_F$ ) <sup>d</sup>								
Choked Flow? <sup>e</sup>								
Peak Flow (bwpd) <sup>f,g</sup>								

<b>Water Tank Flow Rates</b>	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6	Vessel 7	Vessel 8
Flash Flow (Mscfd)								
Working Flow (Mscfd) <sup>l</sup>								

<b>Breathing Rates<sup>m</sup></b>	Oil Tanks	Water Tanks
scfh air/tank	<b>300</b>	
scfh vapor/tank <sup>i</sup>	<b>238</b>	
Mscfd	<b>29</b>	

<b>Flow Rate Summary</b>	<b>Flow Rate (scfh)</b>	
	<b>SLR</b>	<b>Noble</b>
Oil Tank Flash Rate	<b>11,321</b>	<b>11,321</b>
Oil Tank Working Rate	<b>955</b>	<b>952</b>
Water Tank Flash Rate	<b>0</b>	<b>0</b>
Water Tank Working Rate	<b>0</b>	<b>0</b>
Tank Breathing Rate	<b>1,189</b>	<b>1,189</b>
Truck Loading Vapor	<b>2,527</b>	<b>2,527</b>
<b>Total</b>	<b>15,991</b>	<b>15,989</b>

**Engineering Evaluation Verification Audit**  
Consent Decree (90-5-2-1-10811) - 1:15-cv-00841 RBJ

LOD ID: **ZIGGY USX T7N-R64W-S19 L01**

Consent Decree Tank System Number: **1890**

**Audit Notes**

The walkdown checklist (ZIGGY USX T7N-R64W-S19 L01\_WALKDOWN) was not marked as being complete. Completion was verified through other documentation in the final packet (ZIGGY USX T7N-R64W-S19 L01\_FINAL PACKET)

The STEM work request (ZIGGY USX T7N-R64W-S19 L01\_FINAL PACKET, p 3) requests that a new D-grade LP separator be installed on the site. The Job sheet (ZIGGY USX T7N-R64W-S19 L01\_FINAL PACKET, p 24) & Separator sheet (ZIGGY USX T7N-R64W-S19 L01\_FINAL PACKET, p 26) confirm a new LEED separator was installed. A1 from the walkdown checklist (ZIGGY USX T7N-R64W-S19 L01\_WALKDOWN, p 1) confirms the trim size is 1". The valve size was not confirmed, therefore a 2" valve was used in the model to be conservative. This corresponds to the STEM Work request document (ZIGGY USX T7N-R64W-S19 L01\_FINAL PACKET, p 3) which requested a 2" valve with 1" trim be installed. This is the same size valve as was used in the signed evaluation.

There is no diameter of the VOC line from the tanks to the knockout in the field data sheet in the final packet. The Signed Evaluation lists a size of 3". The data request response from 12/10/2018 confirmed the VOC diameter from the KO to the burner is 3".