

APPENDIX A

ASSUMPTIONS AND REFERENCES

**Third-Party Verification Draft Audit Report
Second Audit**

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

March 29, 2019

Engineering Evaluation Verification Audit

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

Assumptions

Parameter	Value	Units	Source
Atmospheric Pressure	12.5	psia	Noble Assumption
Separator Temperature	65	F	Noble Assumption
Water API Gravity	10	°API	API Gravity of Pure Water
Water Specific Gravity	1		Converted Value
Vapor Pressure of Water	0.947	psia	Vapor Pressure at 100 F
Critical Pressure of Water	3200	psia	Critical Pressure
Separator Oil API Gravity	80	°API	Noble Assumption
Separator Oil Specific Gravity	0.67		Converted Value
Stock Tank Oil API Gravity	60	°API	Noble Assumption
Gas Gravity	1.59		Noble Assumption
Water Flash Rate	4	scf/bbl	Noble provided value
Truck Vent Capture Rate	2527	scf/hr	Vapor displaced at Noble's max allowable loadout rate of 450 bbl/hr

Valve Coefficients

- 1" & 1/8"
- 1" & 3/16"
- 1" & 1/4"
- 1" & 3/8"
- 1" & 1/2"
- 2" & 1/4"
- 2" & 3/8"
- 2" & 1/2"
- 2" & 3/4"
- 2" & 1"
- 2" & a*
- 3" & a*
- 3" & 1" (ro)
- 3" & 2" (ro)
- 2" & 2"
- 3" & 2"
- 3" & 3"
- 4" & 3"
- 4" & 4"

Valve Size	Trim Size	Cf	Cv	Source
1"	1/8"	0.58	1.06	Kimray 1 & 2 HPCV Valve Information Sheet for Nominal Trim Type Issued 4/15
1"	3/16"	0.59	1.51	
1"	1/4"	0.78	2.17	
1"	3/8"	0.91	3.22	
1"	1/2"	0.94	5.72	
2"	1/4"	0.55	2.96	
2"	3/8"	0.77	4.04	
2"	1/2"	0.78	7.2	
2"	3/4"	0.8	12.2	
2"	1"	0.77	21.25	
2"	a*	0.75	36.5	Kimray 2" Treater Valve
3"	a*	0.75	93.3	Kimray 3" Treater Valve
3"	1" (ro)	0.75	17.6	February 14, 2017 email from Phil Deis to Susan Gomez and Laura Davis
3"	2" (ro)	0.75	56.8	
2"	2"	0.76	57	Kimray Pilston Balanced High Pressure Control Valve Information Sheet for Issued 4/15
3"	2"	0.75	52.6	
3"	3"	0.76	107	
4"	3"	0.75	115	
4"	4"	0.75	222	

Combustor Capacities

	Manufacturer Published (MSCFD)	Source
Cimarron 48 HV	109.3	EPA Performance Testing for Combustion Control Devices, Manufacturers' Performance Test NSPS 0000 and MACT HH/HHH [Updated 12/15/2015]
Cimarron 60	57.6	
Cimarron 48	30.0	
Cimarron 30	15.0	
Cimarron 24	9.2	
COMM 200 48"	157.0	COMM Combustor 200 Performance Chart - Noble 2014_Dec 2014.pdf, 23 December 2014
COMM 200 48" (1ry-only)	157.0	
COMM 200 48" (2ry-only)	157.0	
LEED 48" Gen 1 #7	140.0	Leed 48-HEC-Data Sheet.pdf, 27 February 2014
LEED 48" Gen 2	140.0	
LEED EC48-2S	119.0	Leed EC48-2S Curves with 1800 Btu/scf gas, Provided by Leed 11/8/2017
LEED 36"	99.0	Leed 36-HEC-Data Sheet.pdf, 27 February 2014
LEED 24" Gen 1 #10	40.0	Leed 24-HEC-Data Sheet.pdf, 27 February 2014
LEED 24" Gen 1 #10 & #9	40.0	
LEED 24" Gen 2 #7	40.0	
LEED 24" Gen2 #7 & #9	40.0	
TEC 4-CS (48" Tornado)	110.4	TEC-3 & 4 CS SPECIFICATIONS-USA-Rev.4.pdf; Based on Max Heat Release and a gas heat content of 1,800 BTU/scf
TEC 3-CS (36" Tornado)	58.4	