	WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DIVISION OF AIR QUALITY 601 57th Street, SE Charleston, WV 25304 Phone: (304) 926-0475 · www.dep.wv.gov/daq	**APPLICATION FOR GENERAL PERMIT REGISTRATION** CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE A STATIONARY SOURCE OF AIR POLLUTANTS

☑ CONSTRUCTION ☐ MODIFICATION ☐ RELOCATION ☐ CLASS I ADMINISTRATVE UPDATE ☑ CLASS II ADMINISTRATVE UPDATE

CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:

☐ G10-D – Coal Preparation and Handling	☐ G40-C – Nonmetallic Minerals Processing
☐ G20-B– Hot Mix Asphalt	☐ G50-B - Concrete Batch
☐ G30-D – Natural Gas Compressor Stations	☐ G60-C – Class II Emergency Generator
☐ G33-A – Spark Ignition Internal Combustion Engines	☐ G65-C – Class I Emergency Generator
☐ G35-A – Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit)	☑ G70-A – Class II Oil and Natural Gas Production Facility

SECTION I. GENERAL INFORMATION

1. Name of Applicant (as registered with the WV Secretary of State's Office):	2. Federal Employer ID No. (FEIN):
Noble Energy, Inc	**73-0785597**

3. Applicant's mailing address:	4. Applicant's Physical Address
c/o Clayton Murral **1000 Noble Energy Drive** **Canonsburg, PA 15317**	

5. If applicant is a subsidiary corporation, please provide the name of parent corporation:

6. WV BUSINESS REGISTRATION. Is the applicant a resident of the State of West Virginia? ☐ YES ☑ NO

- IF YES, provide a copy of the Certificate of Incorporation/ Organization / Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A.

- IF NO, provide a copy of the Certificate of Authority / Authority of LLC / Registration (one page) including any name change amendments or other Business Certificate as Attachment A.

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.):	8a. Standard Industrial Classification (SIC) code:	8b. North American Industry Classification System (NAICS) code:
Oil and Gas Production Facility	**1311**	**211111**

9. DAQ Plant ID No. (for existing facilities only):	10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only):
085-00035	**G70-A-026A**

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site:	12A. Address of primary operating site:
PEN 1 Production Facility	Mailing: Physical: **See Section 14A**

13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☑YES ☐NO

- IF **YES**, please explain: Lease

- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14A. - For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;
- For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP as Attachment F**.

From WV 2 south make a left onto WV 180 south of New Martinsville, follow WV 180 and travel approximately 7.4 miles to the intersection of WV 180 and WV 18, make a left onto WV 18 and travel approximately 17.6 miles to the intersection of WV 18 and WV 74, make a right onto WV 74 and follow it into Ritchie County for approximately 7.8 miles to CR 6 (Bonds Creek Road), make a right onto Bonds Creek Road and travel 2.5 miles to lease road on the right.

15A. Nearest city or town:	16A. County	17A. UTM Coordinates
Pennsboro	**Ritchie County**	Northing (KM): **4353.960000** Easting (KM): **500.619000** Zone: **17.00**

18A. Briefly describe the proposed new operation or change (s) to the facility:	19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Revised production rates to reflect annual average. Installation of one (1) additional enclosed combustion device to control tank vapor. Increase operating hours of the two enclosed combustion devices to 8,760 hrs/year. Correct number of installed tanks. Increase operating hours of Flare. Removal of the VRU	Latitude: **39.33494** Longitude: **-80.99283**

B: 1st ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)

11B. Name of 1st alternate operating site:	12B. Address of 1st alternate operating site:
	Mailing: Physical:

13B. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☑YES ☐NO

- IF **YES**, please explain:

- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14B. - For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road; - For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP as Attachment F**.

15B. Nearest city or town:	16B. County	17B. UTM Coordinates Northing (KM): Easting (KM): Zone:
18B. Briefly describe the proposed new operation or change (s) to the facility:		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: Longitude:

C: 2nd ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)

11C. Name of 1st alternate operating site:	12C. Address of 1st alternate operating site: Mailing: _____ Physical: _____
13C. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☐YES ☐NO - IF **YES**, please explain: _____ - IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.	
14C. - For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road; - For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP as Attachment F**.	

15C. Nearest city or town:	16C. County	17C. UTM Coordinates Northing (KM): Easting (KM): Zone:
18C. Briefly describe the proposed new operation or change (s) to the facility:		19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: Longitude:

20. Provide the date of anticipated installation or change:	21. Date of anticipated Start-up if registration is granted:
1/30/2016 If this is an after the fact permit application, provide the date upon which the proposed change did happen: ___/___/___	**1/30/2016**

22. Provide maximum projected Operating Schedule of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).

Hours per day	**24**	Days per week	**7**	Weeks per year	**52**	Percentage of Operation	**100**

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

23. Include a check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR22 and 45CSR13).

24. Include a Table of Contents as the first page of your application package.

All of the required forms and additional information can be found under the Permitting Section (General Permits) of DAQ's website, or requested by phone.

25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.

- ☐ ATTACHMENT A : CURRENT BUSINESS CERTIFICATE
- ☐ ATTACHMENT B: PROCESS DESCRIPTION
- ☐ ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- ☐ ATTACHMENT D: PROCESS FLOW DIAGRAM
- ☐ ATTACHMENT E: PLOT PLAN
- ☐ ATTACHMENT F: AREA MAP
- ☑ ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION
- ☑ ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS
- ☑ ATTACHMENT I: EMISSIONS CALCULATIONS
- ☑ ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT
- ☐ ATTACHMENT K: ELECTRONIC SUBMITTAL
- ☐ ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE
- ☐ ATTACHMENT M: SITING CRITERIA WAIVER
- ☐ ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS)
- ☑ ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- ☑ OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please DO NOT fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.

SECTION IV. CERTIFICATION OF INFORMATION

This General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of a Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, Emission Inventory, Certified Emission Statement, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. Any administratively incomplete or improperly signed or unsigned Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

☑ I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

☐ I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

☐ I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

☐ I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

☐ I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

☐ I certify that I am the Owner and Proprietor

☐ I hereby certify that _____ is an Authorized Representative and in that capacity shall represent the interest of the business (e.g., Corporation, Partnership, Limited Liability Company, Association Joint Venture or Sole Proprietorship) and may obligate and legally bind the business. If the business changes its Authorized Representative, a Responsible Official shall notify the Director of the Office of Air Quality immediately, and/or,

I hereby certify that all information contained in this General Permit Registration Application and any supporting documents

Signature (Please use blue ink) _____ Responsible Official — Date: 12/22/15

Name & Title (Please print or type) RJ Moses — Operations Manager — Marcellus Business Unit

Signature (Please use blue ink) _____ Authorized Representative (if applicable) — Date

Applicant's Name Noble Energy, Inc

Phone & Fax (724) 820-3001 — Phone — Fax

Email rj.moses@nblenergy.com cc: clayton.murral@nblenergy.com

Attachment I
Emission Units Table
(includes all emission units and air pollution control devices

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
1S-TK5-8	8E-COMB 1-2	4-400 bbl Condensate Tanks	2016	400 bbl each	MODIFICATION	1C OR 2C
2S-TK1-4	8E-COMB1 - 2	4-400 bbl Produced Water Tanks	2016	400 bbl each	MODIFICATION	1C OR 2C
3S-ENG1	3E-ENG1	95 hp CAT G3304NA	2015	276 hp	New	4C-NSCR
3S-ENG2	3E-ENG2	Gas Jack GJ230	2015	46 hp	REMOVAL	3C-NSCR
4S-GPU1	4E-GPU1	GPU Burner	2015	1 MMBtu/hr	New	NONE
4S-GPU2	4E-GPU2	GPU Burner	2015	1 MMBtu/hr	New	NONE
4S-GPU3	4E-GPU3	GPU Burner	2015	1 MMBtu/hr	New	NONE
4S-GPU4	4E-GPU4	GPU Burner	2015	1 MMBtu/hr	New	NONE
4S-GPU5	4E-GPU5	GPU Burner	2015	1 MMBtu/hr	New	NONE
4S-GPU6	4E-GPU6	GPU Burner	2015	1 MMBtu/hr	New	NONE
4S-GPU7	4E-GPU7	GPU Burner	2015	1 MMBtu/hr	New	NONE
4S-GPU8	4E-GPU8	GPU Burner	2015	1 MMBtu/hr	New	NONE
4S-GPU9	4E-GPU9	GPU Burner	2015	1 MMBtu/hr	New	NONE
5S-LP	5E-LP	Low Pressure Separator	2016	0.75 MMBtu/hr	New	NONE
6S-TL1	8E-COMB1-2	Condensate Truck Loadout	2016	99846.3 bbl/yr	New	1C OR 2C
7S-TL2	8E-COMB1 - 2	Produced water truck loadout	2015	407077. bbl/yr	New	NONE
8S-COMB1	8E-COMB1	One (1) Vapor Combustor	2015	7000 scf/hr	New	NONE
8S-COMB2	8E-COMB2	One (1) Vapor Combustor	2016	7000 scf/hr	New	NONE
9S-PILOT1	9E-PILOT1	One (1) Vapor Combustor Pilot	2015	12.5 scf/hr	New	NONE
9S-PILOT2	9E-PILOT2	One (1) Vapor Combustor Pilot	2016	12.5 scf/hr	New	NONE
10S-COMB	10E-COMB	Emergency Flare	2015	13,125 scf/hr	New	NONE
11S-PILOT	11E-PILOT	Combustor Pilot Emissions	2015	12.5 scf/hr	New	NONE
12S-TE Gen	12E-TE Gen	TE Generator	2015	1.44 gal propane/day	New	NONE
14S-VRU	14E-VRU	Vapor Recovery Unit	2015	46 BHP @ RPM	REMOVAL	NONE

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT G

Equipment Data Sheets and Registration Section Applicability Form

General Permit G70-A Registration
Section Applicability Form

General Permit G70-A was developed to allow qualified applicants to seek registration for a variety of sources. These sources include natural gas well affected facilities, storage tanks, natural gas-fired compressor engines (RICE), natural gas producing units, natural gas-fired in-line heaters, pneumatic controllers, heater treaters, tank truck loading, glycol dehydration units, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G70-A allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

Section 5	Natural Gas Well Affected Facility	☑
Section 6	Storage Vessels*	☑
Section 7	Gas Producing Units, In-Line Heaters, Heater Treaters, and Glycol Dehydration Reboilers	☑
Section 8	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)	☐
Section 9	*Reserved*	☐
Section 10	Natural gas-fired Compressor Engine(s) (RICE)**	☑
Section 11	Tank Truck Loading Facility ***	☑
Section 12	Standards of Performance for Storage Vessel Affected Facilities (NSPS, Subpart OOOO)	☐
Section 13	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (NSPS, Subpart JJJJ)	☐
Section 14	Control Devices not subject to NSPS, Subpart OOOO	☑
Section 15	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (40CFR63, Subpart ZZZZ)	☑
Section 16	Glycol Dehydration Units	☐
Section 17	Dehydration Units With Exemption from NESHAP Standard, Subpart HH § 63.764(d) (40CFR63, Subpart HH)	☐
Section 18	Dehydration Units Subject to NESHAP Standard, Subpart HH and Not Located Within an UA/UC (40CFR63, Subpart HH)	☐
Section 19	Dehydration Units Subject to NESHAP Standard, Subpart HH and Located Within an UA/UC (40CFR63, Subpart HH)	☐

* Applicants that are subject to Section 6 may also be subject to Section 12 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 14.

** Applicants that are subject to Section 10 may also be subject to the applicable RICE requirements of Section 13 and/or Section 15.

*** Applicants that are subject to Section 11 may also be subject to control device requirements of Section 14.

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name
PEN 1 Pad Tank Battery	4-400 bbl Condensate Tanks
3. Emission Unit ID number	4. Emission Point ID number
1S-TK5-8	8E-COMB1
5. Date Installed or Modified *(for existing tanks)*	6. Type of change:
	☑New Construction ☐New Stored Material ☐Other
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐Yes ☑No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.)	

I. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons)*. Use the internal cross-sectional area multiplied by internal height. 400 bbl			
9A. Tank Internal Diameter (ft.)	12	9B. Tank Internal Height (ft.)	20
10A. Maximum Liquid Height (ft.)	19.5	10B. Average Liquid Height (ft.)	10
11A. Maximum Vapor Space Height (ft.)	18.3	11B. Average Vapor Space Height (ft.)	10
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as "working volume.		393 bbl	
13A. Maximum annual throughput (gal/yr) per tank	1,048,386	13B. Maximum daily throughput (gal/day) per tank	2,872
14. Number of tank turnovers per year	63 per tank	15. Maximum tank fill rate (gal/min)	2211
16. Tank fill method ☑Submerged ☐Splash ☐Bottom Loading			
17. Is the tank system a variable vapor space system? ☐Yes ☑No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?			
18. Type of tank (check all that apply): ☑Fixed Roof _X_ vertical ___ horizontal ___ flat roof _X_ cone roof ___ dome roof ___ other (describe) ☐External Floating Roof ___ pontoon roof ___ double deck roof ☐Domed External (or Covered) Floating Roof ☐Internal Floating Roof ___ vertical column support ___ self-supporting ☐Variable Vapor Space ___ lifter roof ___ diaphragm ☐Pressurized ___ spherical ___ cylindrical ☐Underground ☐Other (Describe)			

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

☑Refer to enclosed TANKS Summary Sheets
☐Refer to the responses to items 19-26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☑Refer to enclosed TANKS Summary Sheets
☐Refer to the responses to items 27-33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☑ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 34-39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply
☐ Carbon Adsorption 1
☑ Vent to Vapor Combustion Device 1 (vapor combustors, flares, thermal oxidizers)
☐ Condenser 1
☐ Other 1 (describe) - Vapor Recovery Unit
☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____
☐ Conservation Vent (psig)
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name and Cas No.	Flashing Loss Uncontrolled		Breathing Loss Uncontrolled		Working Loss Uncontrolled		Total uncont. Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	Tpy	lb/hr	tpy	lb/hr	tpy	
Total **uncontrolled** VOC emissions for all tanks	136.64	598.47	0.29	4.69	0.07	1.20	137.00	604.36	EPA TANKS 4.0 & HYSYS

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

19. Tank Shell Construction:

☐ Riveted ☐ Gunite Lined ☐ Epoxy Covered rivets ☑ Other (describe)

20A. Shell Color:	20B. Roof Color:	20C. Year Last Painted:

21. Shell Condition (if metal and unlined):

☐ Riveted ☐ Light Rust ☐ Dense Rust ☐ Not Applicable

22A. Is the tank heated? ☐ Yes ☐ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig):

24. Is the tank a **Vertical Fixed Roof Tank**? ☐ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):

25. Complete item 25 for **Floating Roof Tanks** ☑ Does not apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type *(check one)*:

☐ Metallic (mechanical) ☐ Liquid mounted resilient seal
☐ Vapor mounted resilient seal ☐ Other (Describe):

25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No

25D. If yes, how is the secondary seal mounted? *(check one)* ☐Shoe ☐Rim ☐Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐Yes ☐No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☑Does not apply			
26A. Deck Type: ☐Bolted ☐Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐5 ft wide ☐6 ft wide ☐7 ft wide ☐5 x 7.5 ft wide ☐5 x 12 ft wide ☐Other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based:			
28. Daily Avg. Ambient Temperature (°F):	29. Annual Avg. Maximum Temperature (°F):		
30. Annual Avg. Minimum Temperature (°F):	31. Avg. Wind Speed (mph):		
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	33. Atmospheric Pressure (psia):		
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F):	34A. Minimum (°F):	34B. Maximum (°F):	
35. Avg. operating pressure range of tank (psig):	35A. Minimum (psig):	35B. Maximum (psig):	
36A. Minimum liquid surface temperature (°F):	36B. Corresponding vapor pressure (psia):		
37A. Avg. liquid surface temperature (°F):	37B. Corresponding vapor pressure (psia):		
38A. Maximum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):		
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From:			
To:			

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name
PEN 1 Produced Water Tank Battery	4-400 bbl Produced Water Tanks
3. Emission Unit ID number	4. Emission Point ID number
2S-TK1-4	1E-TK1-4
5. Date Installed or Modified *(for existing tanks)*	6. Type of change:
	☐New Construction ☐New Stored Material ☑Other
7A. Description of Tank Modification *(if applicable)*	Existing tanks to be incorporaed into registration
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐Yes ☑No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.)	

I. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons)*. Use the internal cross-sectional area multiplied by internal height. 400 bbl			
9A. Tank Internal Diameter (ft.)	12	9B. Tank Internal Height (ft.)	20
10A. Maximum Liquid Height (ft.)	19.5	10B. Average Liquid Height (ft.)	10
11A. Maximum Vapor Space Height (ft.)	18.3	11B. Average Vapor Space Height (ft.)	10
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as "working volume.		393 bbl	
13A. Maximum annual throughput (gal/yr) per tank	4,274,308	13B. Maximum daily throughput (gal/day) per tank	11,710
14. Number of tank turnovers per year	255 per tank	15. Maximum tank fill rate (gal/min)	1171.8
16. Tank fill method ☑Submerged ☐Splash ☐Bottom Loading			
17. Is the tank system a variable vapor space system? ☐Yes ☑No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?			
18. Type of tank (check all that apply): ☑Fixed Roof _X_ vertical ___ horizontal ___ flat roof _X_ cone roof ___ dome roof ___ other (describe) ☐External Floating Roof ___ pontoon roof ___ double deck roof ☐Domed External (or Covered) Floating Roof ☐Internal Floating Roof ___ vertical column support ___ self-supporting ☐Variable Vapor Space ___ lifter roof ___ diaphragm ☐Pressurized ___ spherical ___ cylindrical ☐Underground ☐Other (Describe)			

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

☐Refer to enclosed TANKS Summary Sheets
☐Refer to the responses to items 19-26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☑Refer to enclosed TANKS Summary Sheets
☐Refer to the responses to items 27-33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☑ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 34-39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☑ Does Not Apply
☐ Carbon Adsorption [1]
☐ Vent to Vapor Combustion Device [1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser [1]
☐ Other [1] (describe) - Vapor Recovery Unit
☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____
☐ Conservation Vent (psig)
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name and Cas No.	Flashing Loss Uncontrolled		Breathing Loss Uncontrolled		Working Loss Uncontrolled		Total uncont. Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	Tpy	lb/hr	tpy	lb/hr	tpy	
Total **uncontrolled** VOC emissions for all tanks	0.86	3.76	1.07	4.69	0.27	1.20	2.20	9.65	Flash Study and TANKS 4.0.9d

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

19. Tank Shell Construction:

☐ Riveted ☐ Gunite Lined ☐ Epoxy Covered rivets ☐ Other (describe)

20A. Shell Color:	20B. Roof Color:	20C. Year Last Painted:

21. Shell Condition (if metal and unlined):

☐ Riveted ☐ Light Rust ☐ Dense Rust ☐ Not Applicable

22A. Is the tank heated? ☐ Yes ☐ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig):

24. Is the tank a **Vertical Fixed Roof Tank**? ☐ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):

25. Complete item 25 for **Floating Roof Tanks** ☑ Does not apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type *(check one)*:
☐ Metallic (mechanical)
☐ Vapor mounted resilient seal
☐ Liquid mounted resilient seal
☐ Other (Describe):

25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No

25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☑ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft wide ☐ 6 ft wide ☐ 7 ft wide ☐ 5 x 7.5 ft wide ☐ 5 x 12 ft wide ☐ Other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based:			
28. Daily Avg. Ambient Temperature (°F):	29. Annual Avg. Maximum Temperature (°F):		
30. Annual Avg. Minimum Temperature (°F):	31. Avg. Wind Speed (mph):		
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	33. Atmospheric Pressure (psia):		
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F):	34A. Minimum (°F):	34B. Maximum (°F):	
35. Avg. operating pressure range of tank (psig):	35A. Minimum (psig):	35B. Maximum (psig):	
36A. Minimum liquid surface temperature (°F):	36B. Corresponding vapor pressure (psia):		
37A. Avg. liquid surface temperature (°F):	37B. Corresponding vapor pressure (psia):		
38A. Maximum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):		
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From:			
To:			

NATURAL GAS FIRED FUEL BURNING UNITS
EMISSION DATA SHEET

Complete the information on this data for each Gas Producing Unit(s), Heater Treater(s), and in-line heater(s) at the production pad. Reboiler information should be entered on the Glycol Dehydration Emission Unit Data Sheet.

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
4S-GPU1	4E-GPU1	Heater	2015	New	None	1.0	1220
4S-GPU2	4E-GPU2	Heater	2015	New	None	1.0	1220
4S-GPU3	4E-GPU3	Heater	2015	New	None	1.0	1220
4S-GPU4	4E-GPU4	Heater	2015	New	None	1.0	1220
4S-GPU5	4E-GPU5	Heater	2015	New	None	1.0	1220
4S-GPU6	4E-GPU6	Heater	2015	New	None	1.0	1220
4S-GPU7	4E-GPU7	Heater	2015	New	None	1.0	1220
4S-GPU8	4E-GPU8	Heater	2015	New	None	1.0	1220
4S-GPU9	4E-GPU9	Heater	2015	New	None	1.0	1220
3S-GPU10	3E-GPU10	Heater	2015	New	None	1.0	1220
9S-LP	9E-LP	Heater	2015	REMOVAL	None	1.0	1220

[1] Enter the appropriate Emission Unit (or Sources) identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

[2] Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.

[3] New, modification, removal

[4] Complete appropriate air pollution control device sheet for any control device.

[5] Enter design heat input capacity in mmBtu/hr.

[6] Enter the fuel heating value in Btu/standard cubic foot.

TANK TRUCK LOADING
EMISSION UNIT DATA SHEET

Furnish the following information for each new or modified bulk liquid transfer area or loading rack at the natural gas production pad. This form is to be used for bulk liquid transfer operations to tank trucks.

1. Emission Unit ID:	2. Emission Point ID:	3. Year Installed/ Modified:
6S-TL1	8E-COMB1	2016

4. Emission Unit Description:

Condensate Truck Loadout

5. Loading Area Data:

5A. Number of pumps:	5B. Number of liquids loaded:	5C. Maximum number of tank trucks loading at one time:
1	1	1

6. Describe cleaning location, compounds and procedure for tank trucks:

N/A

7. Are tank trucks pressure tested for leaks at this or any other location?

☐Yes ☑No

If YES, describe:

8. Projected Maximum Operating Schedule (for rack or transfer point as a whole):

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7

9. Bulk Liquid Data *(add pages as necessary):*

Liquid Name	Condensate		
Max. daily throughput (1000 gal/day) (per tank)	2.87		
Max. annual throughput (1000 gal/yr) (per tank)	1,048		
Loading Method [1]	SUB		
Max. Fill Rate (gal/min)	TBD		
Average Fill Time (min/loading)	TBD		
Max. Bulk Liquid Temperature (°F)	103.5		
True Vapor Pressure [2]	12		
Cargo Vessel Condition [3]	TBD		
Control Equipment or Method [4]	Vapor Combustor		
Minimum collection efficiency (%)	98%		
Minimum control efficiency (%)	98%		

** Continued on next page*

Maximum Emission Rate	Loading (lb/hr)	0.07 controlled		
	Annual (ton/yr)	0.30 controlled		
Estimation Method [5]		EPA		

Notes:

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets as Attachment "H"*):

CA = Carbon Adsorption

VB = Dedicated Vapor Balance (closed system)

ECD = Enclosed Combustion Device

F = Flare

TO = Thermal Oxidation or Incineration

[5] EPA = EPA Emission Factor as stated in AP-42

MB = Material Balance

TM = Test Measurement based upon test data submittal

O = other (describe)

10. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING *Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation/air pollution control device.*	RECORDKEEPING *Please describe the proposed recordkeeping that will accompany the monitoring.*
Track Loading Throughput	Maintain loading throughput records.
REPORTING *Please describe the proposed frequency of reporting of the recordkeeping.*	TESTING *Please describe any proposed emissions testing for this process equipment/air pollution control device.*

11. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty:

TANK TRUCK LOADING
EMISSION UNIT DATA SHEET

Furnish the following information for each new or modified bulk liquid transfer area or loading rack at the natural gas production pad. This form is to be used for bulk liquid transfer operations to tank trucks.

1. Emission Unit ID:	2. Emission Point ID:	3. Year Installed/ Modified:
7S-TL2	2E-TL1	2016

4. Emission Unit Description:

Produced Water Truck Loadout

5. Loading Area Data:

5A. Number of pumps:	5B. Number of liquids loaded:	5C. Maximum number of tank trucks loading at one time:
1	1	1

6. Describe cleaning location, compounds and procedure for tank trucks:

N/A

7. Are tank trucks pressure tested for leaks at this or any other location?

☐Yes ☑No

If YES, describe:

8. Projected Maximum Operating Schedule (for rack or transfer point as a whole):

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7

9. Bulk Liquid Data *(add pages as necessary):*

Liquid Name	Produced Water		
Max. daily throughput (1000 gal/day) (per tank)	11.7		
Max. annual throughput (1000 gal/yr) (per tank)	4,274		
Loading Method [1]	SUB		
Max. Fill Rate (gal/min)	TBD		
Average Fill Time (min/loading)	TBD		
Max. Bulk Liquid Temperature (°F)	70.0		
True Vapor Pressure [2]	< 1		
Cargo Vessel Condition [3]	TBD		
Control Equipment or Method [4]	Vapor Combustor		
Minimum collection efficiency (%)	100		
Minimum control efficiency (%)	0.98		

** Continued on next page*

Maximum Emission Rate	Loading (lb/hr)	0.10	controlled		
	Annual (ton/yr)	0.46	controlled		
Estimation Method [5]		EPA			

Notes:

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets as Attachment "H"*):

CA = Carbon Adsorption

VB = Dedicated Vapor Balance (closed system)

ECD = Enclosed Combustion Device

F = Flare

TO = Thermal Oxidation or Incineration

[5] EPA = EPA Emission Factor as stated in AP-42

MB = Material Balance

TM = Test Measurement based upon test data submittal

O = other (describe)

10. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING *Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation/air pollution control device.*	RECORDKEEPING *Please describe the proposed recordkeeping that will accompany the monitoring.*
Track Loading Throughput	Maintain loading throughput records.
REPORTING *Please describe the proposed frequency of reporting of the recordkeeping.*	TESTING *Please describe any proposed emissions testing for this process equipment/air pollution control device.*

11. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty:

AIR POLLUTION CONTROL DEVICE
Vapor Combustion Control Device Sheet

Complete this vapor combustion control device sheet for each enclosed combustion device, flare, thermal oxidizer, or completion combustion device that is located at the natural gas production pad for the purpose of thermally destructing waste gas to control emissions of regulated pollutants to the atmosphere.

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS FORM BEFORE COMPLETING.

General Information

1. Control Device ID#: 8S-COMB2	2. Installation Date: 1/30/2016	
3. Maximum Rated Total Flow Capacity: 168000 scfd 7000 scfh	4. Maximum Design Heat Input: 10.4 MMBtu/hr	5. Design Heat Content: 2000 Btu/scf

Control Device Information

6. Select the type of vapor combustion control device being used: ☑New

☐Elevated Flare ☐Ground Flare ☐Thermal Oxidizer ☐Completion Combustion Device ☑Enclosed Combustion Device

7. Manufacturer:	Leed	8. Hours of operation per year:	
Model No.:	LDF1350 Dual Stage Combustor	8760	

9. List the emission units whose emissions are controlled by this vapor combustion control device:

(Emission Point ID#: 4E-Comb1)

10. Emission Unit ID#	Emission Source Description:	Emission Unit ID#	Emission Source Description:
6S-TL1	Condensate Truck Loadout	2S-TK1-4	4-400 bbl Condensate Tanks
1S-TK5-8	4-400 bbl Condensate Tanks	7S-TL2	Produced Water Truck Loadout

If this vapor combustor controls emissions from more than six emission units, please attach additional pages.

11. Assist Type	12. Flare Height	13. Tip Diameter	14. Was the design per §60.18?
☐Steam ☐Air ☐Pressure ☑Non	25	ft	☑Yes ☐No

Waste Gas Information

15. Maximum waste gas flow rate (scfm):	16. Heat value of waste gas stream (BTU/ft3)	17. Temperature of the emissions stream (°F)	18. Exit Velocity of the emissions stream (ft/s)
0.086805556	2000	TBD	TBD

19. Provide an attachment with the characteristics of the waste gas stream to be burned.

Pilot Information				
20. Type/Grade of pilot fuel:	21. Number of pilot lights:	22. Fuel flow rate to pilot flame per pilot (scf/hr):	23. Heat input per pilot (BTU/hr):	24. Will automatic re-ignition be used?
Natural Gas	1	12.5	20,000	☑Yes ☐No

25. If automatic re-ignition will be used, describe the method:

Piezoelectric Inspirating Ignitor

26. Describe the method of controlling flame:

27. Is pilot flame equipped with a monitor to detect the presence of the flame?	28. If yes, what type? ☑Thermocouple ☐Infra-red ☐Ultra Violet
☑Yes ☐No	Other, describe:

29. Pollutant(s) Controlled	30. % Capture Efficiency	31. Manufacturer's Guaranteed Control Efficiency (%)
VOC	98%	98

32. Has the control device been tested by the manufacturer and certified? Yes. The control device has been guaranteed by the manufacturer. Please see attached report.

33. Describe all operating ranges and maintenance procedures required by the manufacturer to maintain warranty:

TBD

34. Additional Information Attached? ☑Yes ☐No

Please attach a copy of manufacturer's data sheet.
Please attach a copy of manufacturer's drawing.
Please attach a copy of the manufacturer's performance testing.

If any of the requested information is not available, please contact the manufacturer.

			Item/Tag No.:		Page	1	of	2
			Project No.:		Revision:	B		
			Project:		Date:	27 February 2014		
	Enviromental Control Equipment Data Sheet				By:	JS		
			P.O. No.:	-	Checked:	SG		
			RFQ No.:	-	Approved:	MS		
	Client:		Ref. P&ID:	-				
	Site:		Remarks:	-	Supplier:	LEED FABRICATION		
	Unit/Lease:				Model No.:	L30-0011-00		

GENERAL

1	Design Code:		NDE:	LEED Fabrication Standards
2	Service:		Customer Specs:	☐ Yes
3	Description:	Standard Dual Stage 48 High Efficiency Combustor		☑ No

PROCESS DATA

	Gas Composition:	mol %
4	Methane	
5	Ethane	
6	Propane	
7	I-Butane	
8	n-Butane	
9	I-Pentane	
10	n-Pentane	
11	n-Hexane	
12	CO2	
13	N2	
14	Helium	
15	H_2O	
16	C7	
17	C8	
18	C9	
19	C10	
20	C11+	
21	TOTAL	

Process Conditions:		
Variable	Value	Units
Flow Rate	Up to 140	Mscfd
Pressure	Up to 12	oz/in2
Temperature		°F
Molecular Weight		
Process/Waste Stream	☑ Gas ☐ Liquid	

Detailed Process Description / Process Notes:

1. Turndown 10:1. Based on an expected normal operating rate indicated above.
2. DRE: 98 % operating at design conditions
3. Burner Pressure Drop: Min. 0.10 oz/in2

	Other Components:	PPMV
22	H2S	
23	Benzene	
24	Toluene	
25	E-Benzene	
26	Xylene	

Available Utilities:	
Fuel / Pilot Gas	Min. 30psig Natural Gas /Propane 40-50 SCFH
Instrument Air	NA
Power	120 V / 60 Hz or Solar Power
Steam	NA
Purge Gas	

DESIGN DATA

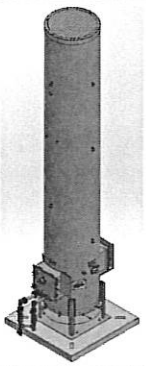
27	Ambient Temperatures:		Noise Performance Requirements:	Under 85 dBA
28	Low, °F	-20	Structural Design Code:	
29	High, °F	120	Wind Design Code:	ASCE
30	Design Conditions: Pressure/Temperature			
31	Max. Relative Humidity, %	90	Pressure/Speed	100 mph
32	Elevation (ASL), ft		Category	
33	Area Classification:	Class I Div 2	Seismic Design Code:	
34	Electrical Design Code:	NEC	Location	

EQUIPMENT SPECIFICATION

35	Type:	☐ Elevated ☑ Enclosed	Equipment Design:	
36		☐ Above Ground	Component	Material / Size / Rating / Other
37		☑ Stack ☐ Multiple Stack	Burner	
38		☐ Portable / Trailer	Burner Tip / Assist Gas Burner	304 SS
39			Burner Body	Carbon Steel
40	Smokeless By:	☐ Steam ☐ Assist Air	Pilot	
41		☐ Gas Assist ☑ Staging	Pilot Tip	304 SS
42			Pilot Line(s)	Carbon Steel
43	Stack:	☑ Self Supporting	Firebox / Stack	
44	Flare Burner:	☐ Non-Smokeless ☑ Smokeless ☐ Gas Assist	Shell	Carbon Steel
45	Pilot:	☑ Intermittent ☐ Continuous	Piping	Carbon Steel
46	Pilot Air Inspirator:	☑ Local ☐ Remote	Nozzles	Carbon Steel
47	Pilot Flame Control:	☐ No ☑ Yes (Thermocouple)	Flanges	Carbon Steel
48			Insulation	Blanket
49	Pilot Ignition:	☐ Flamefront Generator ☑ Inspirating Ignitor	Insulation Pins	304 SS
50		☐ Electronic ☑ Automatic ☐ Manual	Refractory	NA
51		☐ With Pilot Flame Control	Refractory Anchors	NA
52		☐ With Auto Pilot Re-Ignition	Ladders and Platforms	NA
53			Stack Sample Connections	Per EPA requirements
54	Pilot Ignition Backup:	☐ Manual Specify: i.e Piezo-Electric	Sight Glass	2

		Item/Tag No.:		Page	2 of 3	
		Project No.:		Revision:	B	
		Project:		Date:	27 February 2014	
	Environmental Control Equipment Data Sheet	P.O. No.:		By:	JS	
		RFQ No.:		Checked:	SG	
		Ref. P&ID:		Approved:	MS	
	Client:					
	Site:			Supplier:	LEED FABRICATION	
	Unit/Lease:	Remarks:		Model No.:	L30-0011-00	

EQUIPMENT SPECIFICATION

56	Flame Detection:	☐ Thermocouple ☑ Ionization Rod	Auxiliary Equipment	
57		☐ UV Scanner	Valves	NA
58	General Configuration:		Blowers	NA
59			Dampers	NA
60			Inlet KO / Liquid Seal	NA
61			Flame / Detonation Arrestor	Yes
62			Instrumentation & Controls	
63			Solenoids / Shut-Off Valves	Check with Sales for available config.
64			Flow Meters	NA
65			Calorimeter	NA
66			Pressure Switches/Transmitters	NA
67			Thermocouples	Check with Sales for available config.
68			Temperature Switches/Transmitters	NA
69			BMS	Check with Sales for available config.
70			CEMS	NA
71			Other	NA
72				
73				
74				
75				

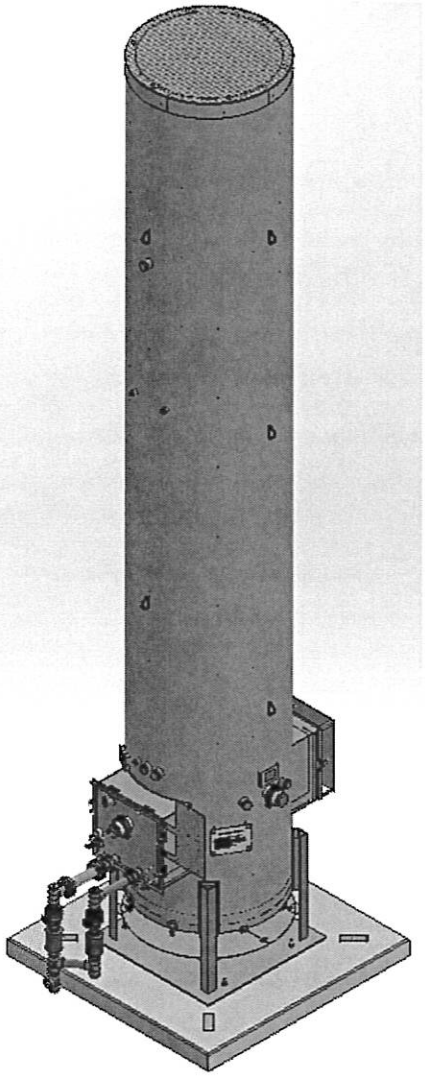
FABRICATION AND INSPECTION

76	Special requirements	☐ Skid Mounted ☑ Concrete Pad	Equipment Info	
77		☐ Other	Component	Weight / Dimensions
78			Burner	
79	Inspection	☑ Vendor Standard	Burner Assembly	
80		☐ Other. Specify:	Stack	
81	Material Certification	☑ Vendor Standard	Stack Assembly	48 " OD x 25 ' H
82		☐ MTR	Pilot Tip	
83		☐ Certificate of Compliance	Pilot Line(s)	
84		☐ Other (Specify):	Stack Assembly	
85	NDE	☑ Vendor Standard	Auxiliary Equipment	
86		☐ Radiography. Specify:	Blowers	
87		☐ Ultrasonic. Specify:	Inlet KO / Liquid Seal	
88		☐ Liquid Penetrant.	Flame / Detonation Arrestor	
89		☐ Magnetic Particles.	Skid	
90		☐ PMI. Specify:	Instrumentation & Controls	
91		☐ Other. Specify:	BMS	
92	Surface Preparation	☑ Vendor Standard	Control Panel	
93		☐ Other. Specify:		
94	Paint System	☑ Vendor Standard		
95		☐ Other. Specify:		
96	Finished Color	☑ Vendor Standard		
97		☐ Other. Specify:		
98				
99				

Additional Notes:

Environmental Control Equipment Data Sheet		Item/Tag No.:		Page	3 of 3
		Project No.:		Revision:	B
		Project:		Date:	27 February 2014
				By:	JS
		P.O. No.:	-	Checked:	SG
		RFQ No.:	-	Approved:	MS
Client:		Ref. P&ID:	-		
Site:				Supplier:	LEED FABRICATION
Unit/Lease:		Remarks:	-	Model No.:	L30-0011-00

GENERAL ARRANGEMENT



AIR POLLUTION TESTING, INC.
DENVER, SALT LAKE CITY

Source Emissions Test Report
Leed Fabrication

Combustor

Milliken, Colorado

Test Dates:
October 27- 28, 2011

Report prepared for:
Leed Fabrication
12535 Weld County Rd. #2
Brighton, Colorado 80601

Report prepared by:
Air Pollution Testing, Inc.
5530 Marshall St.
Arvada, CO 80002

APT Project: LDF1350

DENVER OFFICE
5530 Marshall Street
Arvada, CO 80002
(303) 420-5949
FAX (303) 420-5920
(800) 268-6213

Certification

Team Leader Certification:

I certify that all of the sampling and analytical procedures and data presented in this report are authentic and accurate.

Dane C. Murray

Dane Murray
Field Team Leader

Reviewer Certification:

I certify that all of the testing details and conclusions are accurate and valid.

M. Willinger

Marty Willinger
Technical Writer

Table of Contents

1. Introduction

Air Pollution Testing, Inc. (APT) was contracted by Leed Fabrication (LDF) to conduct source emissions testing services at a facility near Milliken, CO.

The purpose of the testing program was to determine the concentrations and mass emission rates of non-methane/non-ethane organic compounds (NMEOC) from the exhaust stack of one (1) enclosed flare in service at the facility. Data collected was used to determine the unit's NMEOC destruction removal efficiency (DRE). Concurrent gas velocity and concentration measurements of moisture (H_2O), oxygen (O_2), carbon monoxide (CO) and carbon dioxide (CO_2) were conducted at the exhaust sampling location for the determination of mass emission rates.

The emissions testing program contact personnel are shown in Table 1.1 below.

Leed Fabrication : Incinerator DRE Testing Emissions Testing Program Contact Personnel		
Name, Title	*Company, Affiliation Address*	*Phone, FAX*
Mr. Jim Chick, Senior Engineer	Leed Fabrication Services, Inc. 12535 Weld County Road #2 Brighton, Colorado 80601	303-659-6801 ext. 152, 303-558-8909
Mr. Dave Maiers, Operations Director	Air Pollution Testing, Inc. 5530 Marshall Street Arvada, Colorado 80002	303-420-5949 ext. 33, 303-420-5920

Table 1.1: Emissions Testing Program Contact Personnel

2. Methods

APT tested in accordance with the following United States Environmental Protection Agency (EPA) source emissions test methods (referenced in *40 CFR Part 60, Appendix A*).

- *Method 1 – Sample and Velocity Traverses for Stationary Sources*
- *Method 2 – Determination of Stack Gas Velocity and Volumetric Flow Rate*
- *Method 3A – Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)*
- *Method 4 – Determination of Moisture Content of Stack Gases*
- *Method 10 – Determination of Carbon Monoxide Emissions from Stationary Sources*

- *Method 18 – Measurement of Gaseous Organic Compound Emissions by Gas Chromoatography*
- *Method 25A – Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer*

3. Test Program Summary

APT provided all necessary equipment and labor for the determination of all emission parameters detailed in Table 3.1. All gaseous emission parameters were determined using on-site gas analyzers housed in a mobile, analytical trailer to provide a temperature controlled environment for stable accurate analyzer response.

Triplicate, 60-minute test runs were conducted at the unit exhaust stack for the determination of O_2, CO_2, NO_X, CO and NMOC (non-methane organic compounds) concentrations, as well as volumetric flow. Concurrent with emissions sampling, integrated samples of outlet gas were collected in clean, leak-free Tedlar bags which were analyzed for speciated hydro-carbon content. NMEOC DRE was determined using a carbon balance on exhaust pollutant mass emission rates.

Leed Fabrication : Incinerator DRE Testing Sampling and Analytical Methods			
Gas Parameter	*Sampling Method*	*Analytical Method*	*Laboratory*
gas flow	Methods 1, 2	draft gauge, thermocouple, pitot tube	APT, on-site
O_2, CO_2	Method 3A	paramagnetic and non-dispersive infrared analyzers	
H_2O	Method 4	gravimetric	
CO	Method 10	gas filter correlation, infrared analyzer	
NMOC	Method 25A	flame ionization detector	
C_2H_6	Method 18	gas chromatography	APT, off-site

Table 3.1 Emissions Sampling Methods

4. Test Results Summary

The results of the testing are summarized in Tables 4.1 and 4.2. Any emission parameters not found in the tables may be found in *Appendix 1 – Testing Parameters / Sample Calculations*. The following terms are used in the tables:

- %vd – diluent concentration, dry volume percent
- %vw – moisture content, wet volume percent

- dscfm – stack gas flow rate, dry standard (one atmosphere, 68°F) cubic feet per minute
- lb/hr – pollutant mass emission rate, pounds per hour
- ppmvd – parts per million, dry basis
- NMOC – non-methane organic compounds
- NMEOC – non-methane / non-ethane organic compounds
- % DRE – destruction removal efficiency
- C_3H_8 – propane

Leed Fabrication : Combustor DRE Testing Test Results Summary – 10/27/2010				
	Run #1	***Run #2***	***Run #3***	**Average**
Start Time	11:35	13:43	14:58	
Stop Time	12:35	14:43	15:58	
Stack Temp (°F)	82	89	84	**85**
Stack Exhaust Flow (dscfm)	1,880	1,779	1,063	**1,574**
O_2 (%vd)	19.9	20.2	19.5	**19.9**
CO_2 (%vd)	0.8	0.5	1.0	**0.8**
H_2O (%vw)	1.4	1.5	1.4	**1.4**
CO (ppmvd)	14.5	8.2	14.2	**12.3**
NMOC (ppmvd as C_3H_8)	22.1	24.3	19.2	**21.9**
NMEOC (ppmvd as C_3H_8)	12.7	21.3	17.3	**17.1**
Exhaust Emission Data				
CO (lb/hr)	0.1	0.1	0.1	***0.1***
NMOC (lb/hr as C_3H_8)	0.3	0.3	0.1	***0.2***
NMEOC (lb/hr as C_3H_8)	0.2	0.3	0.1	***0.2***
% DRE (NMOC carbon balance)	99.1	98.7	99.4	***99.1***
% DRE (NMEOC carbon balance)	99.5	98.8	99.5	**99.3**

Table 4.1: Test Results Summary

Leed Fabrication : Combustor DRE Testing Test Results Summary – 10/28/2010		
	Run #1	***Run #2***
Start Time	10:20	12:29
Stop Time	11:20	12:47
Stack Temp (°F)	72	71
Stack Exhaust Flow (dscfm)	1,591	3,459
O_2 (%vd)	18.5	15.9
CO_2 (%vd)	1.4	3.2
H_2O (%vw)	1.6	N/A
CO (ppmvd)	19.7	10.5
NMOC (ppmvd as C_3H_8)	19.2	2.2
Exhaust Emission Data		
CO (lb/hr)	0.1	0.2
NMOC (lb/hr as C_3H_8)	0.2	0.1
% DRE (NMOC carbon balance)	99.6	100.0
Inlet Data		
Inlet fuel (oz.)	3.0	13.1

Table 4.2: Test Results Summary

5. Test Method Details

5.1. Stack Gas Velocity, Volumetric Flow Rate and Moisture

Stack gas velocity, volumetric flow rate and moisture (H_2O) content were measured in accordance with EPA Methods 1, 2 and 4.

Each sampling period consisted of conducting a temperature and differential pressure traverse of the stack using a K-type thermocouple and an S-type pitot tube. Concurrent with the traverse, a sample of gas for moisture determination was extracted from the stack at a constant flow rate of no more than 0.75 cubic feet per minute (cfm). The gas sample passed through a stainless steel probe, through a series of four (4) chilled glass impingers, and through a calibrated dry gas meter. See *Appendix 5 –Schematics* for a diagram of the EPA Methods 1, 2 and 4 sampling train.

Prior to sampling, the first two impingers were each seeded with 100 milliliters of water. The third impinger was empty. The fourth impinger was seeded with 250 grams of dried silica gel. Following sampling, the moisture gain in the impingers was measured

gravimetrically to determine the moisture content of the gas.

All of the above data were combined with concurrently collected diluent data to calculate the stack gas velocity and volumetric flow rate in units of feet per second (ft/sec), actual cubic feet per minute (acfm), dry standard (1 atmosphere and 68°F) cubic feet per minute (dscfm), and pounds per hour (lb/hr).

5.2. Diluent (O_2 and CO_2), and Carbon Monoxide

O_2, CO_2, and CO emission concentrations were measured in accordance with EPA Methods 3A (O_2 and CO_2) and 10 (CO). Each sampling period consisted of extracting a gas sample from the stack at a constant flow rate of approximately three liters per minute (lpm). The sample passed through a refrigeration-type gas conditioner to remove moisture and into the sampling port of a TECO Model 48H gas filter correlation infrared CO analyzer, and a Servomex Series 1400 paramagnetic O_2 / non-dispersive infrared CO_2 analyzer. The gas concentrations were displayed on the analyzer front panels in units of either parts per million, dry volume basis (ppmvd – CO) or percent, dry volume basis (%vd – O_2 and CO_2) and logged to a computerized data acquisition system (CDAS). Please see *Appendix 5 – Schematics* for a diagram of the EPA Methods 3A and 10 sampling train.

Before and after each sampling period, the analyzers were challenged with calibration gases to calibrate the instruments, to verify linearity of response, and to quantify zero and span drift for the previous sampling period. The calibration gases were prepared and certified in accordance with EPA Protocol 1. To ensure no system bias, the analyzer calibrations were conducted by introducing all gases to the analyzers at the sampling probe tip at stack pressure. Following sampling, the CDAS data was averaged in one-minute increments, corrected for instrumental drift, and reported as average O_2, CO_2, and CO emission concentrations for each sampling period in units of %vd or ppmvd. The concentration data was combined with concurrently collected stack gas flow data to calculate the CO mass emission rates in units of lb/hr and tpy.

5.3. NMOC Emissions

NMOC concentrations were measured in accordance with EPA Methods 25A. A flame ionization detector (FID) was used to determine NMOC levels. The FID was housed in a mobile analytical trailer to provide a temperature-controlled environment for stable, accurate response.

Each sampling period consisted of extracting a gas sample from the stack at a constant flow rate of approximately three liters per minute using a heated Teflon line. The gas was directed into the sampling port of a TECO Model 55i flame ionization analyzer. NMOC concentrations were displayed on the analyzer front panel in units of parts per million, wet volume basis (ppmvw) and logged to a CDAS (see *Appendix 5 – Schematics*).

Before and after each sampling period, the analyzer was challenged with EPA Protocol 1

calibration gases to calibrate the instrument, to verify linearity of response, and to quantify zero and span drift for the previous sampling period. To ensure no system bias, the analyzer calibrations were conducted by introducing all gases to the analyzer at the sampling probe tip at stack pressure. Following sampling, the CDAS data was averaged in one-minute increments, corrected for instrumental drift, and reported as average emission concentrations for each sampling period.

Concurrent with each NMOC sampling run, APT personnel collected an integrated sample of inlet gas for subsequent speciated TVOC analysis by the APT lab in Arvada, CO. The above data was combined with concurrently collected volumetric flow data to calculate NMOC and NMEOC emissions in units of lb/hr, and the system DRE.

6. Conclusion

The results of the testing demonstrate that the combustor in service at the facility operates at >99 % DRE NMEOC.

Noble Energy, Inc; PEN 1 Production Facility
Emission Summary Sheet

WITHOUT VRU

Emission Unit ID Number	Source Description	Potential Emissions (tpy)										
		NOx	CO	VOC	SOx	PM	PM10	Formaldehyde	Total HAPS	CH_4	CO_2	CO_2e
1S-TK5-8	4-400 bbl Condensate Tanks	-------	-------	VDU	-------	-------	-------	-------	VDU	-------	-------	-------
2S-TK1-4	4-400 bbl Produced Water Tanks	-------	-------	VDU	-------	-------	-------	-------	VDU	-------	-------	-------
3S-ENG1	95 hp CAT G3304NA	1.34	2.69	0.93	-------	-------	-------	-------	0.00	0.69	328.81	345.99
4S-GPU1	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
4S-GPU2	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
4S-GPU3	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
4S-GPU4	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
4S-GPU5	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
4S-GPU6	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
4S-GPU7	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
4S-GPU8	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
4S-GPU9	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	430.82	431.03
5S-LP	Low Pressure Separator Heater	0.27	0.23	0.01	0.00	0.02	0.02	0.00	0.01	0.01	323.11	323.27
6S-TL1	Condensate Truck Loadout	-------	-------	6.41	-------	-------	-------	-------	1.86	-------	-------	-------
7S-TL2	Produced Water Truck Loadout	-------	-------	0.46	-------	-------	-------	-------	0.13	-------	-------	-------
8S-COMB1	Vapor Combustor	1.55	8.44	6.30	-------	-------	-------	-------	1.16	0.04	2683.89	2684.97
8S-COMB2	Vapor Combustor	1.55	8.44	6.30	-------	-------	-------	-------	1.16	0.04	2683.89	2684.97
9S-PILOT1	Combustor Pilot Emissions	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.23	17.24
9S-PILOT2	Combustor Pilot Emissions	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.23	17.24
10S-COMB	Flare	0.96	5.24	20.64	-------	-------	-------	-------	3.75	1.96	1667.69	1716.70
11S-PILOT	Flare Pilot Emissions	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.62	8.62
12S-TE Gen	Thermo Electric Generator	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.88	3.29
FUG	Equipt Component Fugitives Estimate	-------	-------	14.31	-------	-------	-------	-------	1.45	16.88	-------	354.49
Total Facility Emissions (tpy)		**8.96**	**27.80**	**55.53**	**0.02**	**0.27**	**0.27**	**0.00**	**9.59**	**19.70**	**11624.73**	**12036.01**
Total Facility Emissions (lb/hr)		**2.05**	**6.35**	**33.37**	**0.00**	**0.06**	**0.06**	**0.00**	**2.19**	**4.50**	**2,654**	**2,748**
Total Facility Emissions for Major Source Threshold* (tpy)		**8.94**	**27.79**	**41.22**	**0.02**	**0.27**	**0.27**	**0.00**	**8.14**	**2.82**	**11607.85**	**11678.24**

*Excludes fugitive emissions per 45 CSR 14-2.43.e.

Noble Energy, Inc; PEN 1 Production Facility
Emission Summary Sheet

WITH VRU

Emission Unit ID Number	Source Description	Potential Emissions (tpy) NOx	CO	VOC	SOx	PM	PM10	Formaldehyde	Total HAPS	CH_4	CO_2	CO_2e
1S-TK1-15	15-400 bbl Condensate Tanks	---	---	VRU	---	---	---	---	VRU	---	---	---
2S-TK16-30	15-400 bbl Produced Water Tanks	---	---	VRU	---	---	---	---	VRU	---	---	---
3S-ENG-1	95 hp CAT G3304NA	1.34	2.69	0.93	-------	-------	-------	-------	0.00	0.69	328.81	345.99
3S-ENG-2	46 hp Gas Jack	0.89	1.78	0.44	0.00	0.02	0.02	0.03	0.03	0.36	229	236
4S-GPU1	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
4S-GPU2	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
4S-GPU3	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
4S-GPU4	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
4S-GPU5	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
4S-GPU6	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
4S-GPU7	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
4S-GPU8	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
4S-GPU9	1.0 MMBtu/hr Heater	0.36	0.30	0.02	0.00	0.03	0.03	0.00	0.01	0.01	431	431
5S-LP	0.750 MMBtu/hr Heater	0.27	0.23	0.01	0.00	0.02	0.02	0.00	0.01	0.01	323	323
6S-TL1	Condensate Truck Loadout	---	---	27.63	---	---	---	---	4.67	---	---	---
7S-TL2	Produced Water Truck Loadout	---	---	2.35	---	---	---	---	0.07	---	---	---
8S-COMB1	Vapor Combustor	0.16	0.85	0.71	---	---	---	---	0.01	0.19	271	275
9S-PILOT1	Combustor Pilot Emissions	0.01	0.00	0.00	0.00	0.00	0.00	---	---	---	---	6.57
10S-COMB	Flare	0.59	3.19	4.44	---	---	---	---	0.65	0.13	1,015	1,018
11S-Pilot	Flare Pilot Emissions	0.03	0.02	0.00	0.00	0.00	0.00	---	---	---	---	31.54
12S-TE Gen	Thermo Electric Generator	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.88	16.89
FUG	Equipt Component Fugitives Estimate	---	---	14.31	---	---	---	---	1.45	16.88	---	354
Total Facility Emissions (tpy)		**6.52**	**11.49**	**50.99**	**0.02**	**0.28**	**0.28**	**0.04**	**6.96**	**18.34**	**6060.63**	**6487.80**
Total Facility Emissions (lb/hr)		**1.49**	**2.62**	**11.64**	**0.01**	**0.06**	**0.06**	**0.01**	**1.59**	**4.19**	**1383.70**	**1481.23**
Total Facility Emissions for Major Source Threshold* (tpy)		**6.66**	**12.29**	**37.39**	**0.02**	**0.28**	**0.28**	**0.04**	**5.52**	**1.65**	**6,301**	**6,385**

*Excludes fugitive emissions per 45 CSR 14-2.43.e.

Noble Energy, Inc. PEN 1 Production Facility
Tank Detail Sheet

Source ID Number	1S-TK5-8			HYSYS lb/hr*	148.00
Equipment ID		Source Location	Zone:	HYSYS VOC wt%	92%
Tank Description	4-400 bbl Condensate Tanks		Horizontal:	HYSYS prod bbl/d	273.55
Tank Usage	Condensate Storage		Vertical:	to tanks	
Tank Make		Potential operation	8,760 hr/yr		
Tank Capacity	400 bbl				
Serial Number		Potential throughput	274 bbl/day	For all tanks combined	
Date in Service		Potential throughput	99,846 bbl/yr	4,193,544 gal/yr/tk	
Tank Contents	Condensate		12.0 lb VOC/bbl	From HYSYS	
Emission Controls	VDU				
Tank Orientation	Vertical, above ground	Tank Construction	Welded	(Welded, Bolted, Fiberglass)	
Shell Height / Length	20 ft	Roof color & condition	Green, good	(eg. light brown, good)	
Shell Diameter	12 ft	shell color & condition	Green, good	(eg. white, fair)	
Roof Slope	0.06	FR Primary Seal	N/A		
Roof Type (Cone, Dome, IFR, EFR, None)	Cone	FR Seconday Seal	N/A		
Permit Status		Vent pressure setting	0.03 +/- psig		
		VOC Control Efficiency	98 %	Vent to VDU	

Potential Emissions

Pollutant	CAS	Hrs of Operation (hrs/yr)	Estimated Uncontrolled Emissions[1] (lb/hr)	(tpy)	(lb/yr)	Source of Emission Factor	Control
VOC/flash		8760	136.64	598.47	1,196,947	HYSYS	VDU
VOC W&B		8760	0.34	5.89	2,945	TANKS 4.0.9d	VDU
Total VOC			**136.97**	**604.36**			VDU
Total BTEX	0.30% Wt%	8,760	0.00	0.02		HYSYS	VDU
Total Methane	1.02% Wt%	8,760	0.02	0.07		HYSYS	VDU
Total CO2e			0.38	1.66		EPA	

[1]Emissions include working and breathing

Noble Energy, Inc; PEN 1 Production Facility
Condensate Truck Loadout

Source ID Number	6S-TL1	**Location**	
		Zone	17
Source Description	Condensate Truck Loadout	Easting	500.619
Source Usage	Condensate Truck Loadout	Northing	4353.96
		Latitude	39.33494
Potential operation	8,760	Longitiude	-80.99283
Capture Efficiency[3]	0%		

HAP Speciation		
BTEX	2.88% mol% of VOC	from HYSYS, "Condensate from Tanks" stream
BTEX	3.15% wt% of VOC	
n-Hexane	28.21% mol% of VOC	from HYSYS, "Condensate from Tanks" stream
n-Hexane	25.94% wt% of VOC	
Total HAPs	29.09% wt% of VOC	

Potential Emissions

Pollutant	EPA S Factor	True VP of Liquid (psia)	Mol. Wt. of Vapors[4] (lb/lb-mol)	T of Liquid[5] (R)	Oil Volume (bbl/yr)	Estimated Emissions (lb/1000 gal)	Estimated Emissions (PPH)	Estimated Emissions (tpy)	Source of Emission Factor	Notes
VOC	0.6	12	64	563	99,846	10.19	0.00	0.00	AP-42[1]	To VDU
HAPs							0.00	0.00	HYSYS	To VDU
VOC	0.6	12	64	563	99,846	10.83	5.19	22.71	AP-42[1]	Uncaptured
HAPs							0.02	6.61	HYSYS	Uncaptured

[1] EPA AP-42, Volume I, Fifth Edition - January 1995, Table 5.2-1, Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses
[2] API Compendium of Greenhouse Gas Emissions Methodoligies for the Oil and Natural Gas Industry, Table 5-12
[3] EPA AP-42, Volume I, Fifth Edition - January 1995, Section 5.2.2.1.1. Assumes a minimum collection efficiency of 70%.
[4] Molecular Weight of Vapors comes from TANKS4.0.9 run, Liquid Contents of Storage Tank table
[5] Temperature comes from HYSYS run, "Condensate from Tanks" stream

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	PEN 1
City:	Elkins
State:	West Virginia
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	PEN 1 Permit Revision

Tank Dimensions

Shell Height (ft):	20
Diameter (ft):	12
Liquid Height (ft) :	19.5
Avg. Liquid Height (ft):	10
Volume (gallons):	16,497.58
Turnovers:	4.28
Net Throughput(gal/yr):	70,528.50
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

PEN 1 - Vertical Fixed Roof Tank
Elkins, West Virginia

		Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp	Vapor Pressure (psia)			Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight.	Fract.	Fract.	Weight	Calculations
Gasoline (RVP 12)	All	57.2	47.16	67.23	52.14	6.0247	4.9549	7.2711	64			92	Option 4: RVP=12, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

PEN 1 - Vertical Fixed Roof Tank
Elkins, West Virginia

Annual Emission Calcaulations

Standing Losses (lb):	2,542.58
Vapor Space Volume (cu ft):	1,145.11
Vapor Density (lb/cu ft):	0.0695

Vapor Space Expansion Factor:	0.3704
Vented Vapor Saturation Factor:	0.2362
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,145.11
Tank Diameter (ft):	12
Vapor Space Outage (ft):	10.125
Tank Shell Height (ft):	20
Average Liquid Height (ft):	10
Roof Outage (ft):	0.125
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.125
Roof Height (ft):	0
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	6
Vapor Density	
Vapor Density (lb/cu ft):	0.0695
Vapor Molecular Weight (lb/lb-mole):	64
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	6.0247
Daily Avg. Liquid Surface Temp. (deg. R):	516.8667
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R	
(psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.8083
Tank Paint Solar Absorptance (Shell):	0.68
Tank Paint Solar Absorptance (Roof):	0.68
Daily Total Solar Insulation	
Factor (Btu/sqft day):	1,193.89
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.3704
Daily Vapor Temperature Range (deg. R):	40.1436
Daily Vapor Pressure Range (psia):	2.3161
Breather Vent Press. Setting Range(psia):	0.06
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	6.0247
Vapor Pressure at Daily Minimum Liquid	
Surface Temperature (psia):	4.9549
Vapor Pressure at Daily Maximum Liquid	
Surface Temperature (psia):	7.2711
Daily Avg. Liquid Surface Temp. (deg R):	516.8667
Daily Min. Liquid Surface Temp. (deg R):	506.8308
Daily Max. Liquid Surface Temp. (deg R):	526.9026
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.2362
Vapor Pressure at Daily Average Liquid:	
Surface Temperature (psia):	6.0247
Vapor Space Outage (ft):	10.125
Working Losses (lb):	647.4844
Vapor Molecular Weight (lb/lb-mole):	64
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	6.0247
Annual Net Throughput (gal/yr.):	70,528.50
Annual Turnovers:	4.2751
Turnover Factor:	1
Maximum Liquid Volume (gal):	16,497.58
Maximum Liquid Height (ft):	19.5
Tank Diameter (ft):	12
Working Loss Product Factor:	1
Total Losses (lb):	3,190.07

TANKS 4.0.9d
Emissions Report - Detail Format

Individual Tank Emission Totals

Emissions Report for: Annual

PEN 1 - Vertical Fixed Roof Tank
Elkins, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 12)	647.48	2,542.58	3,190.07

Noble Energy, Inc; PEN 1 Production Facility
Tank Detail Sheet

Source ID Number	2S-TK1-4				
Equipment ID		Source Location	Zone:		
Tank Description	4-400 bbl Produced Water Tanks		Horizontal:		
Tank Usage	Produced Water Storage		Vertical:		
Tank Make		Potential operation	8,760	hr/yr	
Tank Capacity	400 bbl	Potential water production	1,115	bbl/day	
Serial Number		Potential water production	407,077	bbl/yr	
Date in Service		Potential oil production*	6,717	Oil/yr	
Tank Contents	Produced Water	Emission Factor	0.01846	lb/bbl VOC from FESCO Flash Study	
Emission Controls	VDU		0.000560	lb/bbl BTEX from FESCO Flash Study	
Tank Orientation	Vertical, above ground	Tank Construction	Welded	(Welded, Bolted, Fiberglass)	
Shell Height / Length	20 ft	Roof color & condition	Green, good	(eg. light brown, good)	
Shell Diameter	12 ft	shell color & condition	Green, good	(eg. white, fair)	
Roof Slope	0.06	FR Primary Seal	N/A		
Roof Type (Cone, Dome, IFR, EFR, None)	Cone	FR Seconday Seal	N/A		
Permit Status		Vent pressure setting	0.03	+/- psig	
		VOC Control Efficiency	98%	%	Vent to VDU

Potential Emissions

Pollutant	CAS	Hrs of Operation (hrs/yr)	Estimated Uncontrolled Emissions[1] (lb/hr)	(tpy)	(lb/yr)	Source of Emission Factor	Control
VOC-Flash		8760	0.86	3.76	7,515	FESCO Flash Summary	VDU
VOC-W&B			1.34	5.89	12,760	TANKS 4.0.9d	VDU
Total VOC			**2.20**	**9.65**			VDU
Total BTEX			**0.026**	**0.114**			VDU

[1]Emissions include working and breathing
*Assumes 1.65% oil in PW

Noble Energy, Inc; PEN 1 Production Facility
Produced Water Truck Loadout

Source ID Number	7S-TL2	**Location**	
		Zone	17
Source Description	Produced Water Truck Loadout	Easting	500.619
Source Usage	Produced Water Truck Loadout	Northing	4353.96
		Latitude	39.33494
Potential operation	8,760	Longitiude	-80.99283
Capture Efficiency	70%		

HAP Speciation		
BTEX	3.15% wt% of VOC	Based on FESCO PW study; ratio of lb BTEX/bbl to lb VOC/bbl of PW
Total HAPs	29.09% wt% of VOC	

Potential Emissions

Pollutant	EPA S Factor	True VP of Liquid (psia)	Mol. Wt. of Vapors[4] (lb/lb-mol)	T of Liquid[5] (R)	Oil Volume (bbl/yr)[2]	Estimated Emissions			Source of Emission Factor	Notes
						(lb/1000 gal)	PPH	(tpy)		
VOC	0.6	12.00	64	530	6,717	10.83	0.10	0.46	AP-42[1]	ATMOSPHERE
HAPs							0.00	0.133	AP-42[1]	ATMOSPHERE
VOC	0.6	12.00	64	530	6,717	10.83	0.24	1.07	AP-42[1]	To VDU
HAPs							0.00	0.311	AP-42[1]	To VDU

[1] EPA AP-42, Volume I, Fifth Edition - January 1995, Table 5.2-1, Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses

[2]The oil volume for this calculation assumes that 1.65% of the produced water volume is oil.

[3]EPA AP-42, Volume I, Fifth Edition - January 1995, Section 5.2.2.1.1. Assumes a minimum collection efficiency of 70%.

[4]Molecular Weight of Vapors comes from TANKS4.0.9 run, Liquid Contents of Storage Tank table

[5]Temperature comes from HYSYS run, "Water Out" stream

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	PEN 1
City:	Elkins
State:	West Virginia
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	PEN 1 Permit Revision

Tank Dimensions

Shell Height (ft):	20
Diameter (ft):	12
Liquid Height (ft) :	19.5
Avg. Liquid Height (ft):	10
Volume (gallons):	16,497.58
Turnovers:	4.28
Net Throughput(gal/yr):	70,528.50
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

PEN 1 - Vertical Fixed Roof Tank
Elkins, West Virginia

		Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp	Vapor Pressure (psia)			Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight.	Fract.	Fract.	Weight	Calculations
Gasoline (RVP 12)	All	57.2	47.16	67.23	52.14	6.0247	4.9549	7.2711	64			92	Option 4: RVP=12, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

PEN 1 - Vertical Fixed Roof Tank
Elkins, West Virginia

Annual Emission Calcaulations

Standing Losses (lb):	2,542.58
Vapor Space Volume (cu ft):	1,145.11
Vapor Density (lb/cu ft):	0.0695

Vapor Space Expansion Factor:	0.3704
Vented Vapor Saturation Factor:	0.2362
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,145.11
Tank Diameter (ft):	12
Vapor Space Outage (ft):	10.125
Tank Shell Height (ft):	20
Average Liquid Height (ft):	10
Roof Outage (ft):	0.125
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.125
Roof Height (ft):	0
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	6
Vapor Density	
Vapor Density (lb/cu ft):	0.0695
Vapor Molecular Weight (lb/lb-mole):	64
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	6.0247
Daily Avg. Liquid Surface Temp. (deg. R):	516.8667
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R	
(psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.8083
Tank Paint Solar Absorptance (Shell):	0.68
Tank Paint Solar Absorptance (Roof):	0.68
Daily Total Solar Insulation	
Factor (Btu/sqft day):	1,193.89
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.3704
Daily Vapor Temperature Range (deg. R):	40.1436
Daily Vapor Pressure Range (psia):	2.3161
Breather Vent Press. Setting Range(psia):	0.06
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	6.0247
Vapor Pressure at Daily Minimum Liquid	
Surface Temperature (psia):	4.9549
Vapor Pressure at Daily Maximum Liquid	
Surface Temperature (psia):	7.2711
Daily Avg. Liquid Surface Temp. (deg R):	516.8667
Daily Min. Liquid Surface Temp. (deg R):	506.8308
Daily Max. Liquid Surface Temp. (deg R):	526.9026
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.2362
Vapor Pressure at Daily Average Liquid:	
Surface Temperature (psia):	6.0247
Vapor Space Outage (ft):	10.125
Working Losses (lb):	647.4844
Vapor Molecular Weight (lb/lb-mole):	64
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	6.0247
Annual Net Throughput (gal/yr.):	70,528.50
Annual Turnovers:	4.2751
Turnover Factor:	1
Maximum Liquid Volume (gal):	16,497.58
Maximum Liquid Height (ft):	19.5
Tank Diameter (ft):	12
Working Loss Product Factor:	1
Total Losses (lb):	3,190.07

TANKS 4.0.9d
Emissions Report - Detail Format

Individual Tank Emission Totals

Emissions Report for: Annual

PEN 1 - Vertical Fixed Roof Tank
Elkins, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 12)	647.48	2,542.58	3,190.07

Noble Energy, Inc; PEN 1 Production Facility
Enclosed Flare Detail Sheet

Source ID Number						
Equipment ID	8S-COMB1		**Truck Loading VOC Emissions & Flash VRU downtime**			
SCC						
			Condensate Tanks	604.36	tpy VOC	109.81 tpy HAPs
Equipment Usage	Vapor Combustor		Condensate Loading	14.96	tpy VOC	4.35 tpy HAPs
			Produced Water Tanks	3.76	tpy VOC	1.75 tpy HAPs
			Produced Water Loading	1.07	tpy VOC	0.31 tpy HAPs
Equipment Make	Leed		Total VOC Emissions	624.15	tpy	116.22 tpy HAPs
Equipment Model	LDF1350 Dual Stage Combustor					
Serial Number	Unknown		Control Efficiency	98%		98%
Installation Date	01/30/16		Controlled VOC Emissions	12.48	tpy	2.32 tpy HAPs
Emission Controls	None		**Combustion**			
Pilot			Molecular Weight of Vapors		lb/lb-mol	
Fuel Heating Value	1220	Btu/scf	Fuel Heating Value	2000	Btu/scf	
Design Heat Rate	0.02	MMBtu/hr	Potential Heat Output	10.417	MMBtu/hr	
Site Heat Rate	0.02	MMBtu/hr	VOC Vapors sent to flare	1248292.9	lbs/yr	
Potential Operation	365	days/yr	Potential Operation	365	days/yr	
Potential Fuel Usage	0.30	Mscf/day	Ave. Gas Flared	125.000	Mscf/day	

9S-PILOT1
Combustor Pilot Emissions

Pollutant	Emission Factor lb/MMSCF	Annual gas Usage MMSCF/yr	Hrs of Operation (hrs/yr)	Estimated Emissions (lb/hr)	Estimated Emissions Pilot tpy	Source of Emission Factor
NOx	100.000	0.11	8760	0.00	0.01	AP-42[2]
CO	84.000	0.11	8760	0.00	0.005	AP-42[2]
PM10	7.600	0.11	8760	0.00	0.00	AP-42[2]
VOC	5.500	0.11	8760	0.00	0.00	AP-42[2]
N_2O	1.000	0.11	8760	0.00	0.00	API
CO_2	120000.000	0.11	8760	1.50	6.57	AP-42[2]

Potential Combustion Emissions

Pollutant	Emission Factor lb/MMBtu	Annual gas Usage MMBtu/yr	Estimated Emissions tpy	Emission Factor Source
NOx	0.068	91250.00	3.10	AP-42[1]
CO	0.370	91250.00	16.88	AP-42[1]
N_2O	0.001	91250.00	0.05	API
CO2	117.650	91250.00	5367.78	AP-42[1]

Total Potential Vapor Combustor Emissions

Pollutant	tpy	lb/hr
NOx	3.11	0.71
CO	16.89	3.86
PM10	0.00	0.00
VOC	12.48	2.85
HAPs	2.32	0.53
N_2O	0.05	0.01
CH_4	0.00	0.00
CO_2	5374.35	1227.02
CO_2e	5388.32	1230.21

[1] EPA AP-42, Volume I, Fifth Edition - September 1991, Table 13.5-1, Emission Factors for Flare Operations.

[2] EPA AP-42, Volume I, Fifth Edition - September 1991, Table 1.4, Emission Factors for Natural Gas Combustion

Stream #		1	2	3	4	5	6	7	8
Description		Well Fluid to Sand Separator	Well Fluid to GPU Separator	Produced Gas to Sales Pipeline	Water to Tanks	Condensate to LP Separator	Condensate from LP Separator	Flash Gas from LP Separator	Flash Gas from Production Tanks
	Unit								
Vapor Fraction		0.789	0.771	1.000	0.000	0.000	0.084	1.000	1.000
Temperature	*F*	80.2	70.0	70.0	70.0	70.0	103.5	117.9	103.5
Pressure	*psig*	2000	500	500	500	500	0.25	25	0.25
Mass Flow	*lb/hr*	90329	90329	69271	16255	4802	2886	1916	148
Vapor Flow	*MMSCFD*	30.689	30.000	30.000	-	-	0.024	0.414	0.024
Liquid Flow	*barrel/day*	-	560	-	-	560	274	-	-
Water Flow	*barrel/day*	1117	1115	-	1115	-	-	-	-
Methane		0.5893	0.5893	0.7610	0.0000	0.1466	0.0032	0.2453	0.0360
Ethane		0.1224	0.1224	0.1557	0.0000	0.1364	0.0133	0.2212	0.1246
Propane		0.0418	0.0418	0.0511	0.0000	0.1365	0.0387	0.2038	0.2397
i-Butane		0.0051	0.0051	0.0058	0.0000	0.0345	0.0197	0.0446	0.0722
n-Butane		0.0114	0.0114	0.0124	0.0000	0.1005	0.0719	0.1201	0.2086
i-Pentane		0.0027	0.0027	0.0025	0.0000	0.0444	0.0531	0.0384	0.0746
n-Pentane		0.0039	0.0039	0.0032	0.0000	0.0750	0.1011	0.0570	0.1118
n-Hexane		0.0044	0.0044	0.0023	0.0000	0.1456	0.2774	0.0548	0.1081
n-Heptane		0.0011	0.0011	0.0003	0.0000	0.0467	0.1038	0.0075	0.0142
n-Octane		0.0011	0.0011	0.0001	0.0000	0.0541	0.1279	0.0034	0.0061
n-Nonane		0.0004	0.0004	0.0000	0.0000	0.0229	0.0555	0.0006	0.0010
n-Decane		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C10+*		0.0008	0.0008	0.0000	0.0000	0.0436	0.1061	0.0005	0.0008
Nitrogen		0.0027	0.0027	0.0035	0.0000	0.0002	0.0000	0.0004	0.0000
CO2		0.0009	0.0009	0.0011	0.0000	0.0005	0.0000	0.0008	0.0002
Oxygen		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O		0.2118	0.2118	0.0008	1.0000	0.0004	0.0000	0.0006	0.0002
Benzene		0.0000	0.0000	0.0000	0.0000	0.0004	0.0007	0.0001	0.0003
Toluene		0.0001	0.0001	0.0000	0.0000	0.0027	0.0060	0.0004	0.0007
E-Benzene		0.0000	0.0000	0.0000	0.0000	0.0023	0.0055	0.0001	0.0002
o-Xylene		0.0001	0.0001	0.0000	0.0000	0.0068	0.0162	0.0003	0.0005
Cyclohexane		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Pennsboro1 Production Facility; Noble Energy, Inc

Flare Detail Sheet

Source ID Number					
Equipment ID	10S-COMB		**LP Separator Gas to Flare (upset)**		
SCC			LP Gas	1,433	lb/hr VOC
				2,063,564	lbs VOC
Equipment Usage	Flare		Total VOC Emissions	1,032	tpy
Equipment Make	Unknown				
Equipment Model	Unknown		VOC Emissions from downtime	1032	tpy
Serial Number	Unknown		Control Efficiency	98	%
Installation Date	Unknown		Controlled VOC Emissions	20.64	tpy
Emission Controls	None		**Combustion**		
Pilot			Molecular Weight of Vapors		lb/lb-mol
Fuel Heating Value	1220	Btu/scf	Fuel Heating Value	1500	Btu/scf
Design Heat Rate	0.07	MMBtu/hr	Potential Heat Output	19.7	MMBtu/hr
Site Heat Rate	0.07	MMBtu/hr	VOC Vapors sent to flare	2063563.9	lbs/yr
Potential Operation	365	days/yr	Potential Operation	60	days/yr
Potential Fuel Usage	1.44	Mscf/day	Ave. Gas Flared	315	Mscf/day

11S-Pilot

Flare Pilot Emissions

Pollutant	Emission Factor lb/MMSCF	Annual gas Usage MMSCF/yr	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	Pilot tpy	
NOx	100.0	0.53	8760	0.01	0.03	AP-42[2]
CO	84.0	0.53	8760	0.01	0.02	AP-42[2]
PM10	7.6	0.53	8760	0.00	0.00	AP-42[2]
VOC	5.5	0.53	8760	0.00	0.00	AP-42[2]
N_2O	1.0	0.53	8760	0.00	0.00	API
CO_2	120,000	0.53	8760	7.20	31.54	AP-42[2]

Potential Combustion Emissions

Pollutant	Emission Factor lb/MMBtu	Annual gas Usage MMBtu/yr	Estimated Emissions tpy	Emission Factor Source
NOx	0.068	28350.00	0.96	AP-42[1]
CO	0.370	28350.00	5.24	AP-42[1]
VOC	0.052	28350.00	0.74	AP-42[1]
N_2O	0.001	28350.00	0.01	API
CO2	117.650	28350.00	1667.69	AP-42[1]

Total Potential Vapor Combustor Emissions

Pollutant	tpy	lb/hr			
NOx	0.96	0.22	LP gas produced	1,916	lb/hr
CO	5.24	1.20	LP gas VOC wt %	74.78%	%
PM10		0.00			
VOC	20.64	4.71			
N_2O	0.01	0.00			
CH_4	0.00	0.00			
CO_2	1667.69	380.75			
CO_2e	1672.17	381.77			

[1] EPA AP-42, Volume I, Fifth Edition - September 1991, Table 13.5-1, Emission Factors for Flare Operations.

[2] EPA AP-42, Volume I, Fifth Edition - September 1991, Table 1.4, Emission Factors for Natural Gas Combustion

ATTACHMENT J

Class I Legal Advertisement

AIR QUALITY PERMIT NOTICE
Notice of Application for Permit Application

Notice is given that Noble Energy, Inc. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Class 2 Administrative Update to the G70-A General Permit Registration for its PEN 1 oil and natural gas production facility located in Ritchie County West Virginia at latitude 39.33494 and longitude -80.99283. From WV 2 south make a left onto WV 180 south of New Martinsville, follow WV 180 and travel approximately 7.4 miles to the intersection of WV 180 and WV 18, make a left onto WV 18 and travel approximately 17.6 miles to the intersection of WV 18 and WV 74, make a right onto WV 74 and follow it into Ritchie County for approximately 7.8 miles to CR 6 (Bonds Creek Road), make a right onto Bonds Creek Road and travel 2.5 miles to lease road on the right.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will now be:

Regulated Pollutant	Potential Annual Emissions in tons per year (tpy)
Nitrogen Oxides	8.96
Carbon Monoxide	27.80
Total Volatile Organic Compounds	55.53
Sulfur Dioxide	0.02
Particulate Matter (PM)	0.27
PM-10	0.27
Total Hazardous Air Pollutants	9.59
Total Carbon Dioxide Equivalent	12,036

Startup of the proposed operation is planned to begin on or about January 30, 2016. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this application for G70A General Permit Registration should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this, Wednesday, December 30, 2015

By: Noble Energy, Inc.
RJ Moses
Operations Manager
Marcellus Business Unit
1000 Noble Energy Drive
Canonsburg, PA 15317

ATTACHMENT O

Emissions Summary Sheets

G-70 A EMISSION SUMMARY SHEET
Noble Energy, Inc; PEN 1 Production Facility

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type[1]	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS[2] (Speciate VOCs & HAPS) See Detail Sheets	Maximum Potential Uncontrolled Emissions[3]		Maximum Potential Controlled Emissions[4]		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used[5]	Emission Concentration[7] (ppmv or mg/m^3)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
8E-COMB 1-2	Vent	1S-TK5-8	4-400 bbl Condensate Tanks	1C and 2C	Vapor Combustor	N/A	N/A	VOCs	137.98	604.36	2.76	12.09	Gas/Vapor	AP-42, HYSYS, Tanks	
								HAPs	25.07	109.81	0.50	2.20	Gas/Vapor	AP-42, HYSYS, Tanks	
8E-COMB1 - 2	Vent	2S-TK1-4	4-400 bbl Produced Water Tanks	1C and 2C	Vapor Combustor	N/A	N/A	VOCs	2.20	9.65	0.04	0.19	Gas/Vapor	Tanks, Flash Study	
								HAPs	0.40	1.75	0.01	0.04	Gas/Vapor	Tanks, Flash Study	
3E-ENG1	Engine Stack	3S-ENG1	95 hp CAT G3304NA	5C	N/A	N/A	N/A	NOx	2.75	12.03	0.31	1.34	Gas/Vapor	AP-42	
								CO	2.75	12.03	0.61	2.69	Gas/Vapor	AP-42	
								VOCs	0.60	2.63	0.21	0.93	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM-10	0.01	0.03	0.01	0.03	Particulate	AP-42	
								HAPs	0.19	0.81	0.00	0.01	Gas/Vapor	AP-42	
								CO2e	78.99	345.99	78.99	345.99	Gas/Vapor	AP-42	
4E-GPU1 - 3E-GPU9	Heater Stack	4S-GPU1 - 4S-GPU9	GPU Burner	N/A	N/A	N/A	N/A	NOx	0.74	3.23	0.74	3.23	Gas/Vapor	AP-42	
								CO	0.62	2.71	0.62	2.71	Gas/Vapor	AP-42	
								VOCs	0.04	0.18	0.04	0.18	Gas/Vapor	AP-42	
								SO2	0.00	0.02	0.00	0.02	Gas/Vapor	AP-42	
								PM-10	0.06	0.25	0.06	0.25	Particulate	AP-42	
								HAPs	0.01	0.06	0.01	0.06	Gas/Vapor	AP-42	
								CO2e	885.67	3,879.23	885.67	3879.23	Gas/Vapor	AP-42	
10E-COMB	Vent	5S-LP	Low Pressure Separator	3C	FLARE	N/A	N/A	VOCs	235.57	1,031.78	28.66	20.64	Gas/Vapor	AP-42, HYSYS	
								HAPs	35.93	157.36	5.21	3.75	Gas/Vapor	AP-42, HYSYS	
								NOx	1.34	0.96	0.22	0.96	Gas/Vapor	AP-42	
								CO	1.20	5.24	1.20	5.24	Gas/Vapor	AP-42	
								CO2e	2384.31	1,716.70	391.94	1,716.70	Gas/Vapor	AP-42	
11E-PILOT	Vent	11S-PILOT	Combustor Pilot Emissions	N/A	N/A	N/A	N/A	NOx	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								VOCs	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM-10	0.00	0.00	0.00	0.00	Particulate	AP-42	
								HAPs	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								CO2e	1.97	8.62	1.97	8.62	Gas/Vapor	AP-42	
6E-TL1	Vent	6S-TL1	Condensate Truck Loadout	1C and 2C	Vapor Combustor	N/A	N/A	VOCs to VDU	3.41	14.96	0.07	0.29	Gas/Vapor	AP-42, HYSYS, Tanks	
								VOCs uncaptured	1.46	6.41	1.46	6.41	Gas/Vapor	AP-42, HYSYS, Tanks	
								HAPs to VDU	0.99	4.35	0.02	0.09	Gas/Vapor	AP-42, HYSYS, Tanks	
								HAPs uncaptured	0.43	1.86	0.43	1.86	Gas/Vapor	AP-42, HYSYS, Tanks	
7E-TL2	Vent	7S-TL2	Produced water truck loadout	1C and 2C	Vapor Combustor	N/A	N/A	VOCs to VDU	0.24	1.07	0.00	0.02	Gas/Vapor	Tanks, Flash Study	
								VOCs uncaptured	0.10	0.46	0.10	0.46	Gas/Vapor	Tanks, Flash Study	
								HAPs to VDU	0.07	0.31	0.00	0.01	Gas/Vapor	Tanks, Flash Study	
								HAPs uncaptured	0.03	0.13	0.03	0.13	Gas/Vapor	Tanks, Flash Study	
8E-COMB1	Vent	8S-COMB1	One (1) Vapor Combustor	N/A	N/A	N/A	N/A	NOx	0.35	1.55	0.35	1.55	Gas/Vapor	AP-42	
								CO	1.93	8.44	1.93	8.44	Gas/Vapor	AP-42	
								CO2e	613.01	2,684.97	613.01	2684.97	Gas/Vapor	AP-42	
8S-COMB2	Vent	8S-COMB2	One (1) Vapor Combustor	N/A	N/A	N/A	N/A	NOx	0.35	1.55	0.35	1.55	Gas/Vapor	AP-42	
								CO	1.93	8.44	1.93	8.44	Gas/Vapor	AP-42	
								CO2e	613.01	2,684.97	613.01	2684.97	Gas/Vapor	AP-42	
9E-PILOT1	Vent	9S-PILOT1	One (1) Vapor Combustor Pilot	N/A	N/A	N/A	N/A	NOx	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								VOCs	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM-10	0.00	0.00	0.00	0.00	Particulate	AP-42	
								HAPs	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								CO2e	3.94	17.24	3.94	17.24	Gas/Vapor	AP-42	
9E-PILOT2	Vent	9S-PILOT2	One (1) Vapor Combustor Pilot	N/A	N/A	N/A	N/A	NOx	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								VOCs	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM-10	0.00	0.00	0.00	0.00	Particulate	AP-42	
								HAPs	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								CO2e	3.94	17.24	3.94	17.24	Gas/Vapor	AP-42	
12E-TE Gen	Vent	12S-TE Gen	TE Generator	N/A	N/A	N/A	N/A	NOx	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								CO	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								VOCs	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM-10	0.00	0.00	0.00	0.00	Particulate	AP-42	
								HAPs	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								CO2e	0.75	3.29	0.75	3.29	Gas/Vapor	AP-42	
5E-LP	Heater Stack	5S-LP	Low Pressure Separator	N/A	N/A	N/A	N/A	NOx	0.06	0.27	0.06	0.27	Gas/Vapor	AP-42	
								CO	0.05	0.23	0.05	0.23	Gas/Vapor	AP-42	
								VOCs	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM-10	0.00	0.02	0.00	0.02	Particulate	AP-42	
								HAPs	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO2e	73.81	323.27	73.81	323.27	Gas/Vapor	AP-42	