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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3345
Plant ID No.:	051-00230
Applicant:	Noble Energy Inc. (Noble)
Facility Name:	Sand Hill 22 (SHL 22)
Location:	Dallas, Marshall County
NAICS Code:	211111 (Natural Gas Production)
Application Type:	Construction
Received Date:	October 14, 2016
Engineer Assigned:	Jerry Williams, P.E.
Fee Amount:	$2,000.00
Date Received:	October 26, 2016
Complete Date:	November 21, 2016
Due Date:	February 19, 2017
Applicant Ad Date	October 13, 2016
Newspaper:	*Moundsville Daily Echo*
UTM's:	Easting: 536.136 km Northing: 4,429.051 km Zone: 17
Description:	Oil and natural gas production facility.

DESCRIPTION OF PROCESS

The following process description was taken from the permit application and supplemental documents:

The SHL 22 site is an oil and gas natural gas production facility. Condensate, gas, sand and water come from eight (8) natural gas wells through eight (8) sand separators. Sand is routed to the unloading vessel which will also be used for well liquids unloading, controlled by a flare (6C-FL). Accumulated sand will be removed periodically for proper disposal. Liquids from the unloading vessel will be transferred to the produced water tanks by a diaphragm pump (10S-Pump) controlled by the flare (6C-FL). From the sand separators, the stream is routed to eight (8) gas production units and heaters (3S-GPU1-8) where fluid separation occurs, controlled by

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16 pneumatic level control valves (11S-LC1-16). Flow to the GPUs will be controlled by eight (8) pneumatic flow control valves (11S-FC1-8). Produced water from the separators flows into four (4) water tanks (1S-TK1-4) controlled by one (1) vapor combustor (4C-COMB). Condensate and gas is routed from the GPUs directly to sales through one (1) pneumatic back pressure control valve (11S-BP). Produced water will be trucked or pumped off location. Any loading emissions will be controlled by the vapor combustor (4C-COMB). If line power is not available, the facility power will be generated by an Acumentrics Remote Power System (8S-4C).

SITE INSPECTION

A site inspection was conducted on November 28, 2016 by Greigory Paetzold of the DAQ Enforcement Section. According to Mr. Paetzold, the location is appropriate and the facility was operating in compliance. The closest residence is approximately 1,000 feet away.

Latitude: 40.010882
Longitude: -80.576596

Directions to the facility are as follows:

From I-70, take Dallas Pike Road (Exit 11). At bottom of ramp, make a right if traveling east or left if traveling west onto CR41 (Dallas Pike Road) and travel 4.9 miles to the town of Dallas. Make a right onto CR7 (Stone Church/Sand Hill Road) and travel 1.8 miles to CR7 (Wye Intersection). Make a left hand turn onto Sand Hill Road and travel 1.1 miles to CR9 (Standiford Hill Road). Make a right and travel 0.1 mile to lease road on left.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this application consist of the emissions from a vapor combustor controlling four (4) produced water tanks and produced water truck loadout, eight (8) GPU burners, one (1) flare controlling a diaphragm pump, one (1) fuel cell, and pneumatic control valves. Fugitive emissions for the facility are based on calculation methodologies presented in EPA Protocol for Equipment Leak Emission Estimates. The following table indicates which methodology was used in the emissions determination:

Emission Point ID#	Process Equipment	Calculation Methodology
4E-COMB	11.7 MMBTU/hr Vapor Combustor	EPA AP-42 Emission Factors, FESCO Flash
2E-TL	85,848,000 gal/yr Uncaptured Truck Loading	EPA AP-42 Emission Factors
3E-GPU1-8	8 -2.0 MMBTU/hr GPUS	EPA AP-42 Emission Factors
5E-PILOT	Vapor Combustor Pilot	EPA AP-42 Emission Factors
6E-FL	74.73 MMBTU/hr Flare	EPA AP-42 Emission Factors, HYSYS
7E-PILOT	Flare Pilot	EPA AP-42 Emission Factors
8E-FC	Fuel Cell	EPA AP-42 Emission Factors
11E-FC1-8	Pneumatic Flow Control Valves	HYSYS
11E-BP	Pneumatic Back Pressure Control Valve	HYSYS
11E-LC1-16	Pneumatic Level Control Valves	HYSYS

The following table indicates the control device efficiencies that are required for this facility:

Emission Unit	Pollutant	Control Device	Control Efficiency
1S-TK1-4(4 – 400 bbl Produced Water Tanks)	Volatile Organic Compounds	Vapor Combustor (4E-COMB)	98 %
	Hazardous Air Pollutants		98 %
2S-TL1 (Produced Water Truck Loadout)	Volatile Organic Compounds	Vapor Combustor (4E-COMB) w/ 70% Capture	69 %
	Hazardous Air Pollutants		69 %

The total facility PTE (including fugitives) for the SHL 22 is shown in the following table:

Pollutant	Maximum Annual PTE (tons/year)
Nitrogen Oxides	10.38
Carbon Monoxide	28.27
Volatile Organic Compounds	27.09
Particulate Matter-10	19.14
Sulfur Dioxide	0.08
Total HAPs	3.36
Carbon Dioxide Equivalent	17,192

Noble Energy, Inc. – SHL 22 (R13-3345)

Emission	Source	NO_x		CO		VOC		PM-10		SO_2		Total HAPs		CO2e
Point ID#		lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	ton/year
4E-COMB	Vapor Combustor (Tanks/Loading)	0.80	3.49	4.33	18.97	0.28	1.24	0.09	0.38	0.01	0.03	0.04	0.18	6051
2E-TL1	Uncaptured Truck Loading	0	0	0	0	0.53	2.30	0	0	0	0	0.12	0.48	2
3E-GPU1-8	8 GPU Burners	1.33	5.84	1.12	4.91	0.07	0.32	0.10	0.44	0.01	0.04	0.03	0.11	7011
5E-PILOT	Vapor Combustor Pilot	0.001	0.01	0.001	0.005	0.0001	0.0003	0.0001	0.0004	0.00001	0.00003	0.00002	0.0001	7
6E-FL	Flare (Diaphragm Pump, Pilot)	5.20	1.04	23.64	4.39	18.34	3.35	0.56	0.11	0.04	0.01	1.35	0.25	2206
8E-FC	Fuel Cell	0.001	0.003	0.0005	0.002	0.0001	0.0003	0.00004	0.0002	0.00001	0.00003	0	0	3
11E-FC1-8	Pneumatic Flow Control Valves	0	0	0	0	2.46	10.76	0	0	0	0	0.20	0.86	1451
11E-BP	Pneumatic Back Pressure Control Valv	0	0	0	0	0.31	1.34	0	0	0	0	0.02	0.11	181
11E-LC1-16	Pneumatic Level Control Valves	0	0	0	0	0.01	0.06	0	0	0	0	0.20	0.86	8
Total Point Source		**7.34**	**10.38**	**29.09**	**28.27**	**22.00**	**19.37**	**0.75**	**0.93**	**0.06**	**0.08**	**1.96**	**2.85**	**16921**
Fugitive	Fugitive Venting	0	0	0	0	1.75	7.72	0	0	0	0	NA	0.51	271
HR	Haulroad Emissions	0	0	0	0	0	0	2.37	18.21	0	0	0	0	0
Total Fugitive		**0.00**	**0.00**	**0.00**	**0.00**	**1.75**	**7.72**	**2.37**	**18.21**	**0.00**	**0.00**	**0.00**	**0.51**	**271**
Total Sitewide		**7.34**	**10.38**	**29.09**	**28.27**	**23.75**	**27.09**	**3.12**	**19.14**	**0.06**	**0.08**	**1.96**	**3.36**	**17192**

REGULATORY APPLICABILITY

The following rules apply to this modification:

45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers)

The purpose of 45CSR2 is to establish emission limitations for smoke and particulate matter which are discharged from fuel burning units. 45CSR2 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

The individual heat input of the GPU burners (3S-GPU1-8) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR2.

Noble would also be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

45CSR6 (To Prevent and Control Air Pollution from the Combustion of Refuse)

The purpose of this rule is to prevent and control air pollution from combustion of refuse.

Noble has one (1) vapor combustor and one (1) flare at the facility. These units are subject to section 4, emission standards for incinerators. These units have negligible hourly particulate matter emissions. Therefore, these units should demonstrate compliance with this section. The facility will demonstrate compliance by maintaining records of the amount of natural gas consumed by these units and the hours of operation. The facility will also monitor the flame of these units and record any malfunctions that may cause no flame to be present during operation.

45CSR10 (To Prevent and Control Air Pollution from the Emissions of Sulfur Oxides)

The purpose of 45CSR10 is to establish emission limitations for sulfur dioxide which are discharged from fuel burning units. 45CSR10 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 3 (weight emission standard), 6 (registration), 7 (permits), and 8 (testing, monitoring, recordkeeping, reporting). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

The individual heat input of the GPU burners (3S-GPU1-8) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR10.

45CSR13 (Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation)

A 45CSR13 construction permit applies to this source due to the fact that Noble exceeds 6 lb/hr and 10 tpy and is subject to a substantive requirement of an emission control rule (40CFR60 OOOOa).

Noble paid the appropriate application fee and published the required legal advertisement for a modification permit application.

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)

45CSR16 applies to this source by reference of 40CFR60, Subpart OOOOa. These requirements are discussed under those rules below.

45CSR22 (Air Quality Management Fee Program)

Noble is not subject to 45CSR30. The SHL 22 site is subject to 40CFR60 Subpart OOOOa, however they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided they are not required to obtain a permit for a reason other than their status as an area source.

Noble is required to pay the appropriate annual fees and keep their Certificate to Operate current.

40CFR60, Subpart OOOOa (Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced after September 18, 2015)

EPA published its New Source Performance Standards (NSPS) for the oil and gas sector on August 16, 2012. EPA published amendments to the Subpart on September 23, 2013 and June 3, 2016.

40CFR60 Subpart OOOOa establishes emission standards and compliance schedules for the control of the pollutant greenhouse gases (GHG). The greenhouse gas standard in this subpart is in the form of a limitation on emissions of methane from affected facilities in the crude oil and natural gas source category that commence construction, modification or reconstruction after September 18, 2015. This subpart also establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO2) emissions from affected facilities that commence construction, modification or reconstruction after September 18, 2015. The effective date of this rule is August 2, 2016.

The affected sources which commence construction, modification or reconstruction after September 18, 2015 are subject to the applicable provisions of this Subpart as described below:

For each well site, the registrant must reduce GHG (in the form of a limitation on emissions of methane) and VOC emissions by complying with fugitive emissions monitoring as required in §60.5397a and the alternative means of emission limitations in §60.5398a.

a. Each well affected facility.

The SHL 22 site consist of eight (8) natural gas wells. The wells were constructed after the September 18, 2015 applicability date. Therefore, the gas wells located at the facility are subject to the requirements of this subpart.

b. A centrifugal compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

There are no centrifugal compressors at the SHL 22 site. Therefore, all requirements regarding centrifugal compressors under 40 CFR 60 Subpart OOOOa would not apply.

c. A reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

There are no reciprocating compressors at the SHL 22 site. Therefore, all requirements regarding reciprocating compressors under 40 CFR 60 Subpart OOOOa would not apply.

d. Each pneumatic controller affected facility not located at a natural gas processing plant, which is a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh.

All pneumatic controllers at the facility will be less than 6 scfh.

e. Each storage vessel affected facility, which is a single storage vessel with the potential for VOC emissions equal to or greater than 6 tpy as determined according to this section. The potential for VOC emissions must be calculated using a generally accepted model or calculation methodology, based on the maximum average daily throughput for a 30-day period of production prior to the applicable emission determination deadline specified in this subsection. The determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a federal or state authority.

A storage vessel with a capacity greater than 100,000 gallons used to recycle water that has been passed through two stage separation is not a storage vessel affected facility.

The storage vessels located at the SHL 22 site are controlled by a vapor combustor which will reduce the potential to emit to less than 6 tpy of VOC. Therefore, Noble is not required by this section to further reduce VOC emissions by 95%.

f. The group of all equipment, except compressors, within a process unit is an affected facility.

The SHL 22 site is not a natural gas processing plant. Therefore, Leak Detection and Repair (LDAR) requirements for onshore natural gas processing plants would not apply.

g. Sweetening units located at onshore natural gas processing plants that process natural gas produced from either onshore or offshore wells.

There are no sweetening units at the SHL 22 site. Therefore, all requirements regarding sweetening units under 40 CFR 60 Subpart OOOOa would not apply.

h. Each pneumatic pump affected facility at well sites, which is a single natural gas-driven diaphragm pump. A single natural gas-driven diaphragm pump that is in operation less than 90 days per calendar year is not an affected facility provided the owner/operator keeps records of the days of operation each calendar year and submits records appropriately.

The pneumatic diaphragm pump at the SHL 22 site is subject to this subpart.

i. The collection of fugitive emission components at a well site is an affected facility. The rule requires leak monitoring twice a year at gas and oil well sites. In addition to optical gas imaging (OGI), the rule allows owners/operators to use Method 21 with a repair threshold of 500 ppm as an alternative for finding and repairing leaks. Method 21 is an EPA method for determining VOC emissions from process equipment. The method utilizes a portable VOC monitoring instrument.

Noble is subject to these LDAR requirements.

The following rules do not apply to the facility:

45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants)

45CSR19 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment)

On September 30, 2013, EPA approved a redesignation request and State Implementation Plan (SIP) revision submitted by the State of West Virginia. The West Virginia Department of Environmental Protection (WVDEP) requested that the West Virginia portion of the Wheeling, WV–OH fine particulate matter (PM 2.5) nonattainment area (''Wheeling Area'' or ''Area'') be redesignated as attainment for the 1997 annual PM 2.5 national ambient air quality standard (NAAQS).

The SHL 22 site is located in Marshall County, which is located in this metropolitan statistical area and is an attainment county for all pollutants. Therefore, this site is not subject to 45CSR19.

As shown in the following table, Noble is not a major source subject to 45CSR14 or 45CSR19 review. According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, the fugitive emissions are not included in the PTE below.

Pollutant	**PSD (45CSR14) Threshold (tpy)**	**NANSR (45CSR19) Threshold (tpy)**	**SHL 22 PTE (tpy)**	**45CSR14 or 45CSR19 Review Required?**
Carbon Monoxide	250	NA	28.27	No
Nitrogen Oxides	250	NA	10.38	No
Sulfur Dioxide	250	NA	0.08	No
Particulate Matter 2.5	250	NA	0.93	No
Ozone (VOC)	250	NA	19.37	No

45CSR30 (Requirements for Operating Permits)

Noble is not subject to 45CSR30. The SHL 22 site is subject to 40CFR60 Subpart OOOOa, however they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided they are not required to obtain a permit for a reason other than their status as an area source.

40CFR60 Subpart Kb (Standards of Performance for VOC Liquid Storage Vessels)

40CFR60 Subpart Kb does not apply to storage vessels with a capacity less than 75 cubic meters. The largest tanks that Noble has installed are 63.59 cubic meters each. Therefore, Noble would not be subject to this rule.

40CFR60 Subpart KKK (Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants)

40CFR60 Subpart KKK applies to onshore natural gas processing plants that commenced construction after January 20, 1984, and on or Before August 23, 2011. The SHL 22 site is not a natural gas processing facility, therefore, Noble is not subject to this rule.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. The following HAPs are common to this industry. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

HAPs	Type	Known/Suspected Carcinogen	Classification
Formaldehyde	VOC	Yes	Category B1 - Probable Human Carcinogen
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Ethylbenzene	VOC	No	Inadequate Data
Toluene	VOC	No	Inadequate Data
Xylenes	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at *www.epa.gov/iris*.

AIR QUALITY IMPACT ANALYSIS

Modeling was not required of this source due to the fact that the facility is not subject to 45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants) or 45CSR19 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment) as shown in the table listed in the Regulatory Discussion section under 45CSR14/45CSR19.

SOURCE AGGREGATION

"Building, structure, facility, or installation" is defined as all the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous and adjacent properties, and are under the control of the same person.

The Source Determination Rule for the oil and gas industry was published in the Federal Register on June 3, 2016 and will become effective on August 2, 2016. EPA defined the term "adjacent" and stated that equipment and activities in the oil and gas sector that are under common control will be considered part of the same source if they are located on the same site or on sites that share equipment and are within ¼ mile of each other.

The SHL 22 site will operate under SIC code 1311 (Natural Gas Production). There are other well pads operated by Noble that share the same two-digit major SIC code of 13 for natural gas production.

"Contiguous or Adjacent" determinations are made on a case by case basis. There are no other equipment and activities in the oil and gas sector that are under common control of Noble that are located on the same site or on sites that share equipment and are within ¼ mile of each other.

The SHL 22 site is not located on contiguous or adjacent properties with other facilities under common control, therefore, the emissions from this facility shall not be aggregated with other facilities for the purposes of making Title V and PSD determinations.

MONITORING OF OPERATIONS

Noble will be required to perform the following monitoring:

- Monitor and record quantity of natural gas consumed for all combustion sources.
- Monitor all applicable requirements of 40CFR60 Subpart OOOOa.
- Monitor the presence of the vapor combustor and flare pilot flames with a thermocouple or equivalent.

Noble will be required to perform the following recordkeeping:

- Maintain records of the hours of operation for the engine.
- Maintain records of the amount of natural gas consumed and hours of operation for the vapor combustor and flare
- Maintain records of testing conducted in accordance with the permit. Said records shall be maintained on-site or in a readily accessible off-site location
- Maintain the corresponding records specified by the on-going monitoring requirements of and testing requirements of the permit.
- Maintain records of the visible emission opacity tests conducted per the permit.
- Maintain a record of all potential to emit (PTE) HAP calculations for the entire facility. These records shall include the natural gas compressor engines and ancillary equipment.
- Maintain records of all applicable requirements of 40CFR60 Subpart OOOOa.
- Maintain records of the vapor combustor and flare design evaluation.

- The records shall be maintained on site or in a readily available off-site location maintained by Noble for a period of five (5) years.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that Noble meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the SHL 22 site should be granted a 45CSR13 construction permit for their facility.

Jerry Williams, P.E.
Engineer

12-20-2016
Date