



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: G70-A026A
Plant ID No.: 085-00035
Applicant: Noble Energy Marketing, Inc. (Noble)
Facility Name: Pennsboro1
Location: near Pennsboro, Ritchie County
NAICS Code: 211111
Application Type: Modification
Received Date: July 21, 2015
Engineer Assigned: David Keatley
Fee Amount: \$1,500
Date Fee Received: July 21, 2015
Complete Date: April 1, 2015
Due Date: May 16, 2015
Applicant Ad Date: August 27, 2014
Newspaper: *Ritchie Gazette and the Cairo Standard*
UTM's: Easting: 500.619 km Northing: 4,353.960 km Zone: 17
Description: With this modification Noble proposing installation and operation of: one (1) 0.75-mmBtu/hr low-pressure tower heater, five (5) 400-bbl condensate tanks, eleven (11) 400-bbl produced water tanks, one (1) 690-bhp compressor engine, one (1) 46-bhp VRU engine, one (1) 10.5-mmBtu/hr vapor combustor, and one (1) 19.7 mmBtu/hr flare. Removal of one (1) 95-bhp compressor engine and one (1) 0.5-mmBtu/hr low-pressure tower heater.

DESCRIPTION OF PROCESS

Raw natural gas (natural gas, condensate, and produced water) will flow from seven (7) Marcellus natural gas wells to wellheads where the flow will be sent to seven (7) 1.0-mmBtu/hr GPU units. The GPUs will be heated by burners to encourage separation. The natural gas from the GPUs will exit the facility via pipeline. The condensate from the GPUs will flow to a low-pressure tower. The low-pressure tower will be heated by a 0.75

mmBtu/hr heater 5S-LP. The flash from the low-pressure tower will be compressed by a flash gas compressor and exit the facility via pipeline. The flash gas compressor will be powered by a four-stroke lean-burn 690 bhp Caterpillar G3508B LE natural gas fired engine which is equipped with a DCL oxidation catalyst. The produced water from the GPUs will flow to fifteen (15) 400-bbl produced water tanks (2S-TK5-8). Condensate from the low-pressure tower will flow into fifteen (15) 400-bbl condensate tanks (1S-TK1-15). Working, breathing, and flash vapors from the condensate and produced water tanks will be compressed by a vapor recovery unit (VRU). The VRU will be powered by a 46 bhp GJ230 Gas Jack engine controlled by a NSCR catalyst. When the VRU is down the working, breathing, and flash emissions from the condensate tanks will be controlled by at least 98% by two (2) 10.5 mmBtu-hr LEED vapor combustors (8S-COMB1 or 8S-COMB2) with a maximum waste gas of 5,980 scf/hr each. To ensure a constant flame each vapor combustor will have a 12.5-scf/hr pilot (9S-PILOT1 and 9S-PILOT2). In the event the flash gas compressor is down the vapors will be sent to a 19.7 mmBtu/hr National Oilwell Varco (NOV) process flare 10S-COMB. The process flare will be controlled with at least 98% control efficiency. Condensate and produced water will exit the facility by truck.

SITE INSPECTION

From I 70 turn onto CR43 (Dallas Pike). Travel south east toward Dallas. Just before Dallas turn onto CR 7 (Dallas/Stone Church Road) west. Travel for approximately 0.9 miles to the road to the facility wh on the left. The facility is at the end of the road approximately 0.7 miles from CR7.

Douglas Hammell of WV DAQ's Compliance and Enforcement section performed a site visit on August 14, 2014. The site was suitable for the G70-A permit. Nearest residence is approximately 690 feet away.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Flashing emissions from 1S-TK1-4 were estimated using a representative liquid sample from Majorville and a gas analysis from this facility in HYSYS Version 8.3 for flashing losses. Flashing emissions for 2S-TK5-8 were estimated by GOR method. Working and breathing emissions were estimated using RVP 15.0 in TANKS 4.0.9d.

Table 1: Estimated Maximum Controlled Point Source Air Emissions

Emissions Point ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
8E-COMB1	Vapor Combustor (Controlling Condensate and Produced Water tanks, Condensate Truck Loading and includes Pilot)	Volatile Organic Compounds	0.16	0.71
		Nitrogen Oxides	0.05	0.21
		Carbon Monoxide	0.26	1.12
		CO ₂ e	83	361
8E-COMB2	Vapor Combustor (Controlling Condensate and Produced Water tanks, Condensate Truck Loading and includes Pilot)	Volatile Organic Compounds	0.16	0.71
		Nitrogen Oxides	0.05	0.21
		Carbon Monoxide	0.26	1.12
		CO ₂ e	83	361
3E-ENG-1	Caterpillar G3508B LE	Nitrogen Oxides	1.52	6.66
		Carbon Monoxide	3.04	13.33
		Volatile Organic Compounds	1.06	4.66
		Sulfur Dioxide	<0.01	0.01
		PM ₁₀	0.05	0.22
		Formaldehyde	0.26	1.16
3E-ENG-2	Gas Jack Engine	CO ₂ e	726	3,179
		Nitrogen Oxides	0.20	0.89
		Carbon Monoxide	0.41	1.78
		Volatile Organic Compounds	0.10	0.44
		PM ₁₀	<0.01	0.02
		Formaldehyde	0.01	0.03
4E-GPU1	GPU Burner 1.0 MMBtu/hr	CO ₂ e	53	229
		Nitrogen Oxides	0.08	0.36
		Carbon Monoxide	0.07	0.30
		Volatile Organic Compounds	<0.01	0.02
		PM ₁₀	0.01	0.03
4E-GPU2	GPU Burner 1.0 MMBtu/hr	CO ₂ e	99	431
		Nitrogen Oxides	0.08	0.36
		Carbon Monoxide	0.07	0.30
		Volatile Organic Compounds	<0.01	0.02
		PM ₁₀	0.01	0.03
4E-GPU3	GPU Burner 1.0 MMBtu/hr	CO ₂ e	99	431
		Nitrogen Oxides	0.08	0.36
		Carbon Monoxide	0.07	0.30
		Volatile Organic Compounds	<0.01	0.02

		PM ₁₀	0.01	0.03
		CO _{2,e}	99	431
4E-GPU4	GPU Burner 1.0 MMBtu/hr	Nitrogen Oxides	0.08	0.36
		Carbon Monoxide	0.07	0.30
		Volatile Organic Compounds	<0.01	0.02
		PM ₁₀	0.01	0.03
		CO _{2,e}	99	431
4E-GPU5	GPU Burner 1.0 MMBtu/hr	Nitrogen Oxides	0.08	0.36
		Carbon Monoxide	0.07	0.30
		Volatile Organic Compounds	<0.01	0.02
		PM ₁₀	0.01	0.03
		CO _{2,e}	99	431
4E-GPU6	GPU Burner 1.0 MMBtu/hr	Nitrogen Oxides	0.08	0.36
		Carbon Monoxide	0.07	0.30
		Volatile Organic Compounds	<0.01	0.02
		PM ₁₀	0.01	0.03
		CO _{2,e}	99	431
4E-GPU7	GPU Burner 1.0 MMBtu/hr	Nitrogen Oxides	0.08	0.36
		Carbon Monoxide	0.07	0.30
		Volatile Organic Compounds	<0.01	0.02
		PM ₁₀	0.01	0.03
		CO _{2,e}	99	431
5E-LP	Heater 0.75 mmBtu/hr	Nitrogen Oxides	0.06	0.27
		Carbon Monoxide	0.05	0.23
		Volatile Organic Compounds	<0.01	0.01
		PM ₁₀	<0.01	0.02
		CO _{2,e}	74	324
6E-TL1	Condensate Truck Loading	Volatile Organic Compounds	6.31	27.63
		Aggregate HAPs	1.07	4.67
7E-TL2	Produced Water Truck Loading	Volatile Organic Compounds	0.54	2.35
		Aggregate HAPs	0.02	0.07
10E-COMB	Flare	Volatile Organic Compounds	1.02	4.44
		Nitrogen Oxides	0.14	0.59
		Carbon Monoxide	0.73	3.19
		CO _{2,e}	233	1,018
12S-TE Gen	Thermoelectric Generator	Nitrogen Oxides	<0.01	0.02
		Carbon Monoxide	<0.01	0.01
		CO _{2,e}	4	17
FUG	Fugitives Emissions	Volatile Organic Compounds	3.27	14.31
		Aggregate HAPs	0.34	1.45
FUG-TL	Produced Water Truck Loading Fugitive Emissions	Volatile Organic Compounds	1.47	6.40
		Aggregate HAPs	0.30	1.29

Table 2: Proposed Estimated Maximum Controlled Facility Wide PTE

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	12.00
Carbon Monoxide	22.96
Volatile Organic Compounds	41.13
Total Particulate Matter	0.50
PM ₁₀	0.50
Sulfur Dioxide	0.04
Formaldehyde	1.19
Total HAPs	6.08
CO _{2e}	9,809

REGULATORY APPLICABILITY

The following rules and regulations apply to the facility:

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

The purpose of 45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) 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 all of the proposed fuel burning units (4S-GPU1 through 4S-GPU7 and 4S-LP) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR2. However, Stone is subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

45CSR4 (To Prevent and Control the Discharge of Air Pollutants into the Open Air which Causes or Contributes to an Objectionable Odor or Odors)

This facility shall not cause the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public. 45CSR4 states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly

authorized representative of the Air Pollution Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable.

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 will have two (2) vapor combustors (LEED) at this facility. The vapor combustor is subject to section 4, emission standards for incinerators. The vapor combustors have capacities of 358 lb/hr which yields an allowable emission rate of 0.98 pounds of particulate matter per hour. The vapor combustor has an hourly particulate matter emissions rate which is less than 0.01 lb/hr. Therefore, the facility's vapor combustors should demonstrate compliance with this section.

Noble has proposed installing one (1) NOV flare at this facility. The flare is subject to section 4, emission standards for incinerators. The flare has a capacity of 1,500 lb/hr which yields an allowable emission rate of 4.08 pounds of particulate matter per hour. The flare has an hourly particulate matter emissions rate which is negligible. Therefore, the facility's flare should demonstrate compliance with this section.

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

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 all of the proposed fuel burning units (4S-GPU1 through 4S-GPU7 and 5S-LP) 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)

As can be seen from Table 2 this facility has an air pollutant which are above the 6lb/hr and 10 tons/year thresholds (VOC and CO) and therefore require a permit due to this rule.

45CSR16 (*Standards of Performance for New Stationary Sources Pursuant to 40CFR60*)

45CSR16 incorporates by reference the standards of performance for new stationary sources (40CFR60). This facility is subject to 40CFR60 Subpart OOOO and 40CFR60 subpart JJJJ and therefore this facility is subject to 45CSR16.

45CSR22 (Air Quality Management Fee Program)

This facility is a minor source as can be seen in Table 2 and not subject to 45CSR30 since they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71. This facility has maximum horsepower capacity less than 1,000 hp (facility wide 720 hp) and is a 9M source and is required to pay the \$200 annual fee. Noble is required to keep their Certificate to Operate current.

40CFR60 Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution)

EPA published in the Federal Register new source performance standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 2012. 40CFR60 Subpart OOOO 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 August 23, 2011. The following affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this subpart:

- a. Each gas well affected facility, which is a single natural gas well.

The seven (7) natural gas wells that currently exist at this facility were drilled principally for the production of natural gas and were done so after August 23, 2011. Therefore, these wells would be considered affected facilities under this subpart. The compliance date for these hydraulically fractured wells is October 15, 2012. Stone is required under §60.5410 to submit an initial notification, initial annual report, maintain a log of records for each well completion, and maintain records of location and method of compliance. §60.5420 requires Noble to demonstrate continuous compliance by submitting reports and maintaining records for each completion operation.

- b. Each reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your reciprocating compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. 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 two (2) reciprocating internal compressors located at this facility. These compressors will be delivered after the effective date of this regulation. However, §60.5365(c) states that 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. Therefore, all requirements regarding reciprocating compressors under 40 CFR 60 Subpart OOOO would not apply.*

- c. Each storage vessel affected facility, which is a single storage vessel, located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment.

40CFR60 Subpart OOOO defines a storage vessel as a unit that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provides structural support and is designed to contain an accumulation of liquids or other materials. The following are not considered storage vessels:

- Vessels that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), and are intended to be located at a site for less than 180 consecutive days. If the source does not keep or are not able to produce records, as required by §60.5420(c)(5)(iv), showing that the vessel has been located at a site for less than 180 consecutive days, the vessel described herein is considered to be a storage vessel since the original vessel was first located at the site.
- Process vessels such as surge control vessels, bottoms receivers or knockout vessels.
- Pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere.

This rule requires that the permittee determine the VOC emission rate for each storage vessel affected facility utilizing a generally accepted model or calculation methodology within 30 days of startup, and minimize emissions to the extent practicable during the 30 day period using good engineering practices. For each storage vessel affected facility that emits more than 6 tpy of VOC, the permittee must reduce VOC emissions by 95% or greater within 60 days of startup. The compliance date for applicable storage vessels is October 15, 2013.

The fifteen condensate tanks located at this facility emit less than 6 tpy of controlled VOC (91.14 tpy uncontrolled per each tank) each. Noble has proposed installing a vapor combustor to control 98% of the VOC emissions from the condensate tanks, which makes this facility not subject to this section of this regulation.

40CFR60 Subpart A §60.18 (General Control Device and Work Practice Requirements)

40CFR60 Subpart A §60.18 contains requirements for control devices when they are used to comply with applicable subparts of 40CFR60 and 40CFR61. The vapor combustors that Noble have/will have is not used to comply with one of these rules. In addition 40CFR60.18 refers to flares but makes no mention of vapor combustors, which are essentially enclosed combustion devices and are not subject to this regulation. The

flare (10E-COMB) is subject to these requirements. For the flare the presence of a pilot flame shall be continuously monitored using a thermocouple or any other equivalent device to detect the presence of a flame when vapors are vented to the flare. To demonstrate compliance with the visible emissions requirements Noble shall conduct visible emission checks and/or opacity monitoring and recordkeeping.

40CFR60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE))

Engines (3S-ENG1 and 3S-ENG2) are subject to 40CFR60 Subpart JJJJ because construction was after June 12, 2006. Engines (3S-ENG1 and 3S-ENG2) were manufactured after July 1, 2010 (non-emergency SI natural gas lean-burn greater than 1,350 bhp).

[40CFR60.4230(4)]

40CFR60.4248 Table 1 provides the allowable emission standards for stationary spark ignition internal combustion engines. Engine 3S-ENG1 is non-emergency lean-burn $500 \leq \text{hp} \leq 1,350$ bhp manufacturer date after July 1, 2010 the allowable emission standards in g/hp-hr are: 1.0 for NO_x, 2.0 for CO, and 0.7 for VOC. The estimated emissions were estimated in g/hp-hr with: 1.0 for NO_x, 2 for CO, and 0.43 for VOC, which are at or below the allowable standards. The engines will also have operating limits, performance tests, notification requirements, and recordkeeping requirements.

Engine 3S-ENG2 must comply with emission standards in for field testing in 40 CFR 1048.101(c) for non-emergency stationary SI ICE. The emission standards for engine 3S-ENG2 in g/kW-hr are the following: NO_x – 3.8 and CO – 6.5.

40CFR63 Subpart ZZZZ (National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

The facility is a minor source of hazardous air pollutants (HAPS < 10 tpy of an individual HAP and < 25 tpy of aggregate HAPS) as can be seen in Table 2. The facility is therefore considered an area source (§63.6585(c)). The engine is considered new stationary RICE (§63.6590(a)(2)(iii)) due to the installation dates of the engines (3S-ENG1 and 3S-ENG2) being after June 12, 2006.

Stationary RICE subject to Regulations under 40 CFR Part 60 must meet the requirements of those subparts that apply (40 CFR 60 Subpart JJJJ, for spark ignition engines) if the engine is a new stationary RICE located at an area source (§63.6590(c)(1)). No additional requirements apply for these engines under this subpart.

The following regulations do not apply to the facility:

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 tanks that Noble has proposed to install are 63.60 cubic meters each. Therefore this facility is not subject to this regulation.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There will be small amounts of various regulated hazardous air pollutants emitted from the operation of this facility as seen in Table 1. The facility is a minor source of HAPs as can be seen in Table 2. If you want to obtain additional information about certain hazardous air pollutants feel free to visit [<http://www.epa.gov/ttn/atw/hlthef/hapindex.html>].

RECOMMENDATION TO DIRECTOR

The information provided in this facility's permit application indicates that compliance with all state and federal air quality requirements will be achieved . It is recommended that Noble be granted a G70-A for their natural gas production facility Pennsboro1.



David Keatley
Permit Writer - NSR Permitting

April 3, 2015

Date

Fact Sheet G70-A026A
Noble Energy Marketing, Inc.
Pennsboro1