west virginia department of environmental protection

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# ENGINEERING EVALUATION / FACT SHEET

## BACKGROUND INFORMATION

| | |
|---|---|
| Application No.: | G70-A188 |
| Plant ID No.: | 049-00188 |
| Applicant: | EQT Production Company |
| Facility Name: | GLO-76 |
| Location: | Near Mannington, Marion County, West Virginia |
| NAICS Code: | 211111 |
| Application Type: | Construction |
| Received Date: | November 9, 2015 |
| Engineer Assigned: | David Keatley |
| Fee Amount: | $4,000 |
| Date Received: | December 4, 2015 |
| Complete Date: | March 3, 2016 |
| Due Date: | April 17, 2016 |
| Applicant Ad Date: | November 11, 2015 |
| Newspaper: | Times West Virginian |
| UTM's: | Easting: 543.845 Northing: 4,379.489 Zone: 17 |
| Description: | Installation and operation of: ten (10) 400-bbl produced liquid tanks, one (1) 140-bbl sand separator tank, nine (9) 1.54-mmBtu/hr line heaters, three (3) 0.013-mmBtu/hr thermoelectric generators, one (1) 65-mmscfd triethylene glycol (TEG) dehydration unit with associated 0.75-mmBtu/hr reboiler, one 100-bbl drip tank, and one (1) 8.33-mmBtu/hr enclosed combustor. |

## DESCRIPTION OF PROCESS

Raw natural gas from nine (9) natural gas wells is sent through sand separator(s). Liquid from the sand separator flows to one (1) 140-bbl sand separator tank (S011). The gas from the sand separator(s) goes to line heaters (S012 - S020). The line heaters increases the temperature of the gas to encourage phase separation in a separator. The gas from the separator is sent to a dehydration unit to reduce the water content of the natural gas stream. The produced liquids from the separator are sent to ten (10) 400-bbl

tanks (S001 - S010). The produced liquids will be trucked off site at a maximum rate of 9,972,333 gallons/year.

After separation the natural gas goes to the contractor of the TEG dehydration unit to reduce the water content of the natural gas. Natural gas will flow countercurrent to circulating TEG. After dehydration the natural gas stream will exit the facility via pipeline. The rich TEG will first go to a flash tank where the volatile organic will be liberated and are controlled by one (1) 8.33-mmBtu/hr LEED 36" enclosed combustor C001. The liquids from the flash tank will go to the regenerator where water is boiled off through the still vent S024 which is controlled by enclosed combustor C001. The enclosed combustor will have a thermocouple to detect the presence of the flame. The regenerator is heated by one (1) 0.75-mmBtu/hr reboiler.

## SITE INSPECTION

Brian Tephabock from DAQ's Compliance and Enforcement Section performed a site visit on February 17, 2016. The site is very remote and the only homes are at the entrance of thee access road which is several hundred yards to the pad.

The directions to the facility from the application are: Head North on I-79 to exit 136. At the bottom of the ramp make a left on to Fairmont Gateway Connector, then go 1.2 miles going straight through two traffic circles. Continue straight onto Jefferson St. crossing the bridge, for 0.4 miles. Turn left onto Jackson St. and continue 0.1 miles to U.S. Rt. 250 North. Turn right and go 13.4 miles to Market Street, then turn left. Travel 0.1 miles, continue on Buffalo St. Continue 5.9 miles, then turn left onto Brink Road (Co Rt. 1). Travel 4.5 miles to access road on right.

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Line Heaters and Thermoelectric Generators: Potential emissions from the line heater and Thermoelectric Generators of all criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 emission factors for natural gas combustion. These calculations are based on a site-specific heat content of natural gas of 1,050 Btu/scf and a maximum design heat input. Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.

Enclosed Combustor and TEG Dehydration Unit

A representative sample was used in E&P Tanks to estimate the flash emissions and in TANKS 4.0.9d to estimate working and breathing losses from the produced liquid tanks, dehydration drip tank, and sand separator tank emissions.

A LEED 36" enclosed combustor will be used to control 98% of the VOCs and HAPs from the flash tank and still vent of TEG dehydration unit. A representative gas sample

composition was used in GRI-GLYCalc 4.0 and half the detection limit if HAPs were reported to be NIL and a 20% increase to help account for gas variation was used to estimate the emissions from the combustor.

Table 1: Estimated Maximum Controlled PTE

| Emission Point ID | Emission Unit ID | Emission Source | Pollutant | Maximum Hourly Emissions (lb/hr) | Maximum Annual Emissions (tpy) |
|---|---|---|---|---|---|
| E001-E010 and E026 | S001-S010 and S026 | Produced Liquid Tanks and Dehy Drip Tank (Emissions per Tank) | Volatile Organic Compounds | 0.05 | 0.20 |
| E011 | S011 | Sand Separator Tank | Volatile Organic Compounds | <0.01 | 0.02 |
| E012-E020 | S012-S020 | Line Heaters 1.54 mmBtu/hr (Air Emissions from Each Unit) | Nitrogen Oxides | 0.14 | 0.61 |
| | | | Carbon Monoxide | 0.12 | 0.51 |
| | | | Volatile Organic Compounds | 0.01 | 0.03 |
| | | | PM | 0.01 | 0.05 |
| | | | $PM_{10}$ | 0.01 | 0.05 |
| | | | $CO_2e$ | 181 | 790 |
| E021-E023 | S021-S023 | Thermoelectric Generators (Air Emissions from Each Unit) | $CO_2e$ | 2 | 7 |
| C001 | S024 and C001 | LEED 36" Enclosed Combustor (Combustor Controlling Flash Tank Vapors and Still Vent Vapors) 8.33 mmBtu/hr | Nitrogen Oxides | 0.76 | 3.32 |
| | | | Carbon Monoxide | 0.64 | 2.79 |
| | | | Total Particulate Matter | 0.06 | 0.25 |
| | | | Sulfur Dioxide | <0.01 | 0.02 |
| | | | Volatile Organic Compounds | 0.29 | 1.25 |
| | | | Benzene | 0.01 | 0.02 |
| | | | Toluene | 0.02 | 0.08 |
| | | | Xylenes | 0.02 | 0.08 |

| | | | | | |
|---|---|---|---|---|---|
| | | | n-Hexane | <0.01 | 0.01 |
| | | | $CO_2e$ | 1,026 | 4,493 |
| E025 | S025 | Reboiler 0.75 mmBtu/hr | Nitrogen Oxides | 0.07 | 0.30 |
| | | | Carbon Monoxide | 0.06 | 0.25 |
| | | | Volatile Organic Compounds | <0.01 | 0.02 |
| | | | PM | 0.01 | 0.02 |
| | | | $CO_2e$ | 88 | 385 |
| E027 | S027 | Truck Loading (uncaptured) | Volatile Organic Compounds | 0.22 | 0.96 |
| | | | n-hexane | <0.01 | 0.02 |

Table 2: Summarized Estimated Maximum Controlled Regulated Facility Wide PTE

| Pollutant | Maximum Annual Facility Wide Emissions (tons/year) |
|---|---|
| Nitrogen Oxides | 9.14 |
| Carbon Monoxide | 7.68 |
| Volatile Organic Compounds | 10.15 |
| Total Particulate Matter | 2.77 |
| $PM_{10}$ | 1.22 |
| Sulfur Dioxide | 0.05 |
| Benzene | 0.03 |
| Toluene | 0.06 |
| Xylenes | 0.08 |
| n-Hexane | 0.17 |
| Total HAP Emissions | 0.43 |
| $CO_2e$ | 13,224 |

REGULATORY APPLICABILITY

The following rules and regulations apply to the facility.

**45CSR2** *To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers*

This rules establishes emission limitations for smoke and particulate matter which are discharged from fuel burning units. Per §45-2-11, any fuel burning unit(s) having a heat input under ten (10) million Btu/hr will be exempt from sections 4, 5, 6, 8 and 9. The facility is proposing to install nine (9) line heaters rated at 1.54 MMBtu/hr, three (3) thermoelectric generator rated at 0.013 MMBtu/hr. The fuel buring units will be subject to the opacity requirements set forth in section §45-2-3 of this rule.

The facility will demonstrate compliance with this rule by conducting monthly visible emission checks in accordance with 40 CFR 60, Appendix A, Method 9 at the request of the Director.

**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 rule is designed to prevent and control the discharge of 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** *Control of Air Pollution from Combustion of Refuse*

This rule establishes emission standards for particulate matter and requirements for particulate matter and requirements for activities involving incineration of refuse which are not subject to, or are exempted from regulation under a federal counterpart for specific combustion sources. This rule also prohibits open burning and sets forth the registration, permitting, reporting, testing, emergency, natural disaster and exemption provisions for activities involving the combustion of refuse and land clearing debris.

The facility has proposed a vapor combustor for controlling the working/breathing/flashing emissions from the condensate/produced water storage tanks. The vapor combustor must meet the requirements for the emission standards

set forth in section 4.1 of this rule, were the allowable particulate matter emission rate to be discharged is determined below.

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)
Where, the factor, F, is as indicated in Table I below:
**Table I:** Factor, F, for Determining Maximum
Allowable Particulate Emissions.
Incinerator Capacity Factor F
A. Less than 15,000 lbs/hr 5.43
B. 15,000 lbs/hr or greater 2.72

Emissions to the incinerator are 279 lbs/hr.

Emissions (lb/hr) = 5.43 x 0.14 tons/hr = 0.76 lb/hr

The estimated hourly particulate matter emission rate from the combustor is 0.06 lb/hr. The facility's proposed enclosed combustor should meet the emission requirements of this rule. The facility will demonstrate compliance by maintaining and operating the combustor properly.

The enclosed combustor must meet the visible emissions requirements of this rule, which limits the combustor to 20% opacity during operation per section 4.3 of this rule. The permittee will be required to operate the enclosed combustor according to manufacturer specifications in order to maintain a smokeless operation. The permittee will also be required to conduct Method 9 opacity checks upon request of the Director.

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

The primary purpose of this rule is to prevent and control air pollution from the emission 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 proposed nine (9) line heaters rated at 1.54 MMBtu/hr and three (3) thermoelectric generator rated at 0.013 MMBtu/hr are below individual heat input of all of the proposed fuel burning units of 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*

This facility is subject to 40CFR60 subpart OOOO which is a substantive requirement and this facility requires a permit.

**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 is not a natural gas compressor station and is a 9M source which is required to pay a $200 annual fee. EQT 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 ($SO_2$) 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 nine (9) natural gas wells were drilled principally for the production of natural gas and condensate 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. Antero 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 Antero demonstrate continuous compliance by submitting reports and maintaining records for each completion operation.*

b. 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.

*Produce liquid tanks, sand separator tank, and dehydration drip tank (S001-S010 and S026) located at this facility are estimated to emit less 6 tpy of VOC per tank uncontrolled. Therefore this facilities tanks are not subject to this section of this regulation.*

The following rules and regulations do not apply to the facility:

**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 enclosed combustor that EQT has proposed is not used to comply with one of these regulations. The purpose of the enclosed combustor is to control emissions from the tanks that are routed to it. However, these tanks are not subject to 40CFR60 Subpart Kb due to their size. In addition 40CFR60.18 refers to flares but makes no mention of enclosed combustion devices. Therefore this facility is not subject to this regulation.

**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 Antero has proposed to install are 63.60 cubic meters each. Therefore, Antero would not be subject to this regulation.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from this facility and that are not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen ($NO_x$), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns ($PM_{10}$), Particulate Matter less than 2.5 microns ($PM_{2.5}$), and Sulfur Dioxide ($SO_2$). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) standards promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

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. Antero included the following HAPs as emitted in substantive amounts in their emissions estimate: Benzene, n-Hexane, Toluene, Xylene, and Ethylbenzene. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

**Potential HAPs - Carcinogenic Risk**

| HAPs | Type | Known/Suspected Carcinogen | Classification |
|---|---|---|---|
| **n-Hexane** | HAP | No | Inadequate Data |
| **Benzene** | TAP | Yes | Category A - Known Human Carcinogen |
| **Toluene** | HAP | No | Inadequate Data |
| **Xylene** | HAP | No | Inadequate Data |
| **Ethylbenzene** | HAP | No | Category D - Not classifiable as to human carcinogenicity |

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health affects 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*.

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 and this facility is expected to meet the requirements of General Permit G70-A. It is recommended that EQT should be granted a G70-A permit for GLO-76 Pad.

David Keatley

David Keatley
Permit Writer - NSR Permitting

March 10, 2016

Date