west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	G70-A160
Plant ID No.:	017-00037
Applicant:	EQT Production Company
Facility Name:	OXF-44 Pad
Location:	Near New Milton, Doddridge County, West Virginia
NAICS Code:	211111
Application Type:	Modification
Received Date:	May 15, 2015
Engineer Assigned:	David Keatley
Fee Amount:	$1,500
Date Fee Received:	May 19, 2015
Complete Date:	July 9, 2015
Due Date:	August 23, 2015
Applicant Ad Date:	May 19, 2015
Newspaper:	*The Herald Record*
UTM's:	Easting: 516.041 km Northing: 4,332.905 km Zone: 17
Description:	Installation and operation of three (3) 400-bbl produced liquid tanks, two (2) 1.54-mmBtu/hr line heaters, one (1) 140-bbl sand separator tank, and one (1) 0.013-mmBtu/hr thermoelectric generator. Removal of five (5) 210-bbl produced liquid tanks.

DESCRIPTION OF PROCESS

Raw natural gas from seven (7) natural gas wells will pass through sand separator(s). Liquids from the sand separator(s) are sent to a 140 bbl sand separator tank (S019). The vapors from the sand separator(s) are sent to six (6) 1.54-mmBtu/hr line heaters (S011 through S014, S020, and S021), where the natural gas is heated to promote phase separation. The flow from the line heaters is sent to a two-phase separator. The natural gas from the separator exits the facility via pipeline. The liquids from the separator are sent to eight (8) 400-bbl produced liquid tanks (S001 through S005 and S016 through S018). The vapors from the produced liquid tanks will be controlled by an enclosed

combustion device (C001). The liquids from the produced liquid tanks are loaded into trucks with vapor return to C001 and the liquids are trucked off site (S023). The enclosed combustor is one (1) 11.66-mmBtu/hr LEED Fabrication 48" enclosed combustor. This facility also has two (2) 0.013-mmBtu/hr thermoelectric generators (S015 and S022) to provide electrical power to this facility.

SITE INSPECTION

James Robertson of DEP DAQ Compliance and Enforcement Section performed a site inspection December 9, 2013. The facility was deemed in compliance.

Directions: [Latitude: 39.14514, Longitude: -80.81368] From the junction of Taylor Drain Rd. (CR 19) and Sugar Run Rd. (CR 52), travel west on Sugar Run for 0.6 miles and go straight onto Brushy Fork Rd.-Summers Rd.-CR 7/18 and travel 0.6 miles to the junction of Brushy Fork Rd. and Middle Fork Rd. (CR 22/3). From this junction turn left onto Middle Fork Rd. and travel approximately 1.2 miles (the road will merge into Straight Fork Rd.-CR 52/3) until reaching the EQT access road on the left. Proceed on the access road for 1.2 miles up the hill to the OXF-44 well-pad and production facility.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The produced liquid gas composition was based on the average of representative samples from a well at wellpad OXF-121 and a well at wellpad OXF-136. The enclosed combustor emissions C001 were estimated with a 95% minimum control efficiency. The collection efficiency for liquid loading used was 70%. Vapors from the produced liquid tanks and sand separator tank were estimated with E&P Tanks 2.0. Emissions for the line heaters and thermoelectric generators were estimated with AP-42 emission factors.

Table 1: Estimated Summarized Maximum Controlled PTE

Emission Point ID	Emission Unit ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
E011 through E014 E020 through E021	S011 through S014 S020 through S021	Line Heaters (Total)	Nitrogen Oxides	0.75	3.30
			Carbon Monoxide	0.63	2.77
			Volatile Organic Compounds	0.04	0.18
			PM	0.06	0.25
			PM_{10}	0.06	0.25
			CO_2e	1,081	4,735

C001	S001 through S006, S016, and C001	LEED 48" Combustor (Controlled vapors from: Produced Liquid Tanks, Truck Loading, and Sand Tank)	Nitrogen Oxides	0.95	4.18
			Carbon Monoxide	0.80	3.51
			Volatile Organic Compounds	5.98	26.18
			Total Particulate Matter	0.07	0.32
			CO_2e	1,417	6,206
E019	S019	Sand Separator Tank	Volatile Organic Compounds	0.07	0.30
E015 and E022	S015 and S022	Thermoelectric Generators	Nitrogen Oxides	<0.01	0.01
			CO_2e	10	43
E023	S023	Tank Truck Loading (uncaptured)	Volatile Organic Compounds	0.13	0.58

Table 2: Summarized Estimated Maximum Controlled Regulated Facility Wide PTE

Pollutant	Maximum Annual Facility Wide Air Emissions (tons/year)
Nitrogen Oxides	7.49
Carbon Monoxide	6.29
Volatile Organic Compounds	40.89
Total Particulate Matter	6.81
PM_{10}	2.16
Sulfur Dioxide	0.04
Benzene	0.02
Toluene	0.04
Xylenes	0.02
n-Hexane	0.39
Total HAP Emissions	0.57
CO_2e	11,795

REGULATORY APPLICABILITY

The following rules and regulations apply to the proposed to this facility:

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

The Line Heaters (S020 - S021) have been determined to meet the definition of a "fuel burning unit"s under 45CSR2 and are, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of the units are less than 10 mmBtu/hr, they are not subject to sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement is under Section 3.1 - Visible Emissions Standards.

Pursuant to 45CSR2, Section 3.1, the line heaters are subject to an opacity limit of 10%. Proper maintenance and operation of the units (and the use of natural gas as fuel) should keep the opacity of the units well below 10% during normal operations.

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 Particulate Air Pollution from Combustion of Refuse

EQT has proposed an enclosed combustor for controlling the working/breathing/flashing emissions produced from the condensate/produced-water storage tanks. The vapor combustor meets the definition of an "incinerator" under 45CSR6 and is, therefore, subject to the requirements therein. The substantive requirements applicable to the vapor combustor are discussed.

45CSR6 Emission Standards for Incinerators - Section 4.1

Section 4.1 limits PM emissions from incinerators to a value determined by the following formula:

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

While particulate matter emissions from the combustor are expected to be nominal, for a conservative estimate, EQT calculated potential particulate matter emissions from the unit based on an emission factor taken from AP-42, Section 1.4. Using this emission factor, the hourly particulate matter emission rate from either combustor is 0.08 lbs/hr. Based on information included in the application, the maximum vapor mass sent to the combustor will be 450 lb/hr (0.225 tons/hour), which gives a factor of 5.43. Based on the above, the aggregate particulate matter limit of the combustor is 1.23 lbs/hr. Therefore, the combustor should demonstrate compliance with this standard.

45CSR6 Opacity Limits for - Section 4.3, 4.4

Pursuant to Section 4.3, and subject to the exemptions under 4.4, the combustor has a 20% limit on opacity during operation. As the primary constituent in the vapors combusted in the unit shall be clean burning methane/ethane, particulate matter emissions from the combustor are expected to be nominal. Therefore, the vapor combustor should easily meet this requirement.

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 (S020 through S021) 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)

The VOC PTE exceeds the thresholds of 6 lb/hr and 10 tons/year and therefore this facility requires a permit.

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 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 the regulations this facility is subject to are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71. This facility has a maximum horsepower capacity less than 1,000 hp and is a 9M source and is required to pay a $200 annual fee. EQT is required to keep their Certificate to Operate current.

40 CFR 60, Subpart OOOO: Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

On April 27, 2012 the USEPA issued a final rule (published in the Federal Register on August 16, 2012) that consists of federal air standards for natural gas wells that are hydraulically fractured, along with requirements for several other sources of pollution in the oil and gas industry that were not regulated at the federal level. Final amendments to the rule were issued on September 23, 2013. Pursuant to §60.5365(a) each "gas well affected facility, which is a single natural gas well" that is constructed after August 23, 2011 is subject to the applicable provisions of Subpart OOOO as well as "[e]ach 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."

Gas Wells - §60.5370

EQT is proposing to drill gas wells at this facility and, therefore, these are defined as "affected facilities" under Subpart OOOO and subject to applicable provisions. The substantive requirements for gas wells drilled prior to January 1, 2015 are given under §60.5375(a)(3) of the rule. It requires that flowback emissions (gas produced from the well after fracturing) must be directed to the flow line or a completion combustion device. EQT shall direct all gas from wells during flowback at this facility into the flow line. Other requirements pertaining to the gas wells include:

- EQT must maintain a log for each well completion operation at each gas well affected facility. The log must be completed on a daily basis for the duration of the well completion operation and must contain the records specified in §60.5420(c)(1)(iii).
[40CFR§60.5375(b)]

- EQT must demonstrate initial compliance with the standards that apply to gas well affected facilities as required by §60.5410.
[40CFR§60.5375(c)]

- EQT must demonstrate continuous compliance with the standards that apply to gas well affected facilities as required by §60.5415.
[40CFR§60.5375(d)]

- EQT must perform the required notification, recordkeeping, and reporting as required by §60.5420.
[40CFR§60.5375(e)]

Storage Tanks - §60.5395 - *(non applicability)*

Under §60.5395, the requirements for storage tanks take effect on October 15, 2013. The substantive requirement for storage tanks is given under §60.5395(a) of the rule. It requires that for each storage vessel "emitting more than 6 tpy VOC, [the permittee] must reduce VOC emissions by 95.0 percent of greater. . ." Based on a letter from USEPA to the American Petroleum Instituted dated September 28, 2012, applicability of storage vessels to Subpart OOOO is based on individual tank PTE - which includes federally enforceable control devices.

The six (6) produced liquid tanks are each calculated to have a PTE (including controls) of less than 6 TPY of VOCs and, therefore, these storage tanks are not subject requirements under §60.5395.

Pneumatic Controllers

Pursuant to §60.5365(d)(2), "[f]or the natural gas production segment (between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not including natural gas processing plants), each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh" that is constructed after August 23, 2011 is subject to the applicable provisions of Subpart OOOO. The substantive requirements for pneumatic controllers are given under §60.5390. EQT has indicated in the application, that all subject pneumatic controllers will have a bleed rate of less than 6 scfh and will, therefore, be exempt from the requirements.

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

Subpart Kb—Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

Pursuant to §60.110b, 40 CFR 60, Subpart Kb applies to "each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984." The storage tanks located at this facility are each 16,800 gallons, or about 64 m^3. Therefore, Subpart Kb does not apply to the storage tanks due to the tank volume.

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. Antero included the following HAPs as emitted in substantive amounts (0.01 tons/year) in their emissions estimate: Benzene, n-Hexane, Toluene, Ethylbenzene, and Xylenes. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 3: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
n-Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Xylenes	VOC	No	Inadequate Data

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*. This facility is a minor source of HAPs as can be seen in Table 2. 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 the permit application indicates compliance with all state and federal air quality requirements will be satisfied and this facility is expected to meet the requirements of General Permit G70-A. Therefore EQT's request to modify and operate their natural gas production facility OXF-44 Pad is recommended to the Director of Air Quality.

David Keatley
Permit Writer - NSR Permitting

July 28, 2015
Date