



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: G70-A112
Plant ID No.: 017-00047
Applicant: EQT Production Company
Facility Name: OXF-157 Pad
Location: West Union, Doddridge County
NAICS Code: 211111
Application Type: Construction
Received Date: November 21, 2014
Engineer Assigned: Roy F. Kees, PE
Fee Amount: \$1,500.00
Date Received: December 3, 2014
Complete Date: December 10, 2014
Due Date: January 25, 2014
Applicant Ad Date: November 25, 2014
Newspaper: *The Herald Record*
UTM's: Easting: 520.160 km Northing: 4,343.00 km Zone: 17
Description: Application for a natural gas well pad consisting of ten (10) line heaters, ten (10) condensate storage tanks, one (1) sand trap blowdown tank, two (2) thermoelectric generators, two (2) enclosed combustors and truck loading.

DESCRIPTION OF PROCESS

EQT Production Company (EQT) has submitted a permit application for the construction and operation of a natural gas production wellpad.

When in production, raw gas from the ten (10) wells pass through sand traps where sediment is removed. Fluids from the sand traps are manually blown down to the sand trap blowdown tank (S023). From the sand traps, the raw gas is routed through the line heaters (S001-S010) to assist with the phase separation process in the downstream three-phase separators. In the separator, produced fluids are removed from the gas and transferred to the condensate storage tanks (S011-S020). Emissions from the condensate

tanks and sand trap blowdown tank are captured and routed to one of the two enclosed combustion devices (C021, C022) and burnt.

Produced fluids are pumped into a tank truck (S023) on an as-needed basis and are disposed of off-site. Vapors during truck loading will be controlled by either of the enclosed combustion devices (C021, C022).

The thermoelectric generators are operated with natural gas and used to provide electricity to the site.

SITE INSPECTION

Site visit was conducted on 12/16/14 by James Robertson of the Enforcement Section. "The site itself has been developed and a drill rig was working at the time of my visit. No equipment in the proposed permit was present.

The area in general is remote with very few houses nearby. There is extensive oil and gas development going on all around the area. The site itself is located in a valley well over 300' away from any residence.

In my opinion this site is suitable for a General Permit."

While traveling Route 50 West at the town of West Union turn left onto WV-18. Travel for about 2 miles and turn left onto Maxwell Ridge (Route 13). Continue for over 2.5 miles and make sharp turn onto Oil Well Road. Follow Oil Well Road for 0.6 miles and turn left at the fork. Then travel for 0.2 miles and make a sharp left (next left available.) After ¼ mile make a left. Continue for 0.5 miles and facility will be on the right.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

EQT included in Attachment I of the general permit application air emissions calculations for the new flare at the OXF-157 natural gas production facility. The following will summarize the calculation methodologies used by EQT to calculate the potential-to-emit (PTE) of the proposed equipment.

Storage Tanks & Flare

Working, breathing and flashing emissions from the ten (10) 400 bbl condensate/produced water storage tanks (S011-S020) and one (1) 140 bbl sand trap blowdown tank (S026) were calculated using ProMax and assuming 98% control for the combustion device. Input and summary sheets for ProMax were included in the general permit application. An aggregate annual throughput of 11,026,260 gallons of condensate/liquid per year was used in the calculations for the storage tanks.

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Line Heaters & Thermoelectric Generators

Criteria Pollutant emissions from the natural gas-fired line heaters (S001-S010) and the thermoelectric generators (S024-S025) were based on the emission factors provided for natural gas combustion as given in AP-42 (AP-42 is a database of emission factors maintained by USEPA) Section 1.4. Emissions of Greenhouse Gases (GHGs) were based on Tables C-1 and C-2 of 40 CFR 98 - Federal GHG Reporting Rule.

Hourly emissions were based on the maximum design heat input (MDHI) of each unit and annual emissions were based on an annual operation of 8,760 hours. A heat content of the gas of 1,050 Btu/scf was used in the calculations.

Truck Loading

Air emissions from condensate truck loading operations occur as fugitive emissions generated by displacement of vapors when loading trucks. The emission factor used to generate the VOC emissions is based on AP-42 Table 5.2-1. The equation used to generate the VOC emissions is based on AP-42 Table 5.2-1 with submerged fill loading (which the permit will require). Additionally, worst-case annual emissions were based on a maximum loading rate of 11,026,260 gal/year of condensate. Capture efficiency is assumed to be 70% for the loading rack with the remaining emissions sent to the enclosed combustion devices with 98% control efficiency.

Emissions Summary

Based on the above estimation methodology, which is determined to be appropriate, the PTE of the new equipment at the OXF-157 natural gas production facility is given in the following table:

| Emission Unit | Pollutant | Maximum Hourly Emissions (lb/hr) | Maximum Annual Emissions (tpy) |
|---|----------------------------|----------------------------------|--------------------------------|
| S001-S010 (10) 1.0 mmBtu/hr Line Heaters (Combined) | Nitrogen Oxides | 1.00 | 4.30 |
| | Carbon Monoxide | 0.80 | 3.60 |
| | Volatile Organic Compounds | 0.05 | 0.20 |
| | Sulfur Dioxide | <0.01 | 0.03 |
| | Particulate Matter-10 | 0.07 | 0.30 |
| | CO ₂ e | 1,183.50 | 5,183.60 |

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| | | | |
|--|----------------------------|-------|-------|
| S011-S020 & S026 Condensate & Blowdown Tanks (Combined) | Volatile Organic Compounds | 2.28 | 10.00 |
| | Total HAPs | 0.09 | 0.41 |
| S027 Cond. Loading | Volatile Organic Compounds | 0.04 | 0.18 |
| | Total HAPs | <0.01 | <0.01 |
| Flare C021-22 | Nitrogen Oxides | 2.30 | 10.04 |
| | Carbon Monoxide | 1.92 | 8.44 |
| S021-S022 (2) Thermoelectric Generators | Nitrogen Oxides | <0.01 | 0.01 |
| | Carbon Monoxide | <0.01 | 0.01 |
| | Volatile Organic Compounds | <0.01 | <0.01 |
| | Formaldehyde | <0.01 | <0.01 |
| | CO ₂ e | 3.08 | 13.48 |
| Fugitives | Volatile Organic Compounds | 0.18 | 0.77 |
| | Total HAPs | 0.02 | 0.07 |

The total facility potential to emit (PTE) is shown in the following table:

| Pollutant | Facility Wide Emissions (tons/year) |
|----------------------------|-------------------------------------|
| Nitrogen Oxides | 14.34 |
| Carbon Monoxide | 12.05 |
| Volatile Organic Compounds | 11.74 |
| Particulate Matter-10/2.5 | 1.09 |
| Sulfur Dioxide | 0.09 |
| Total HAPs | 0.75 |
| Carbon Dioxide Equivalent | 20,069.10 |

REGULATORY APPLICABILITY

The proposed EQT natural gas production facility is subject to substantive requirements in the following state and federal air quality rules and regulations: 45CSR2, 45CSR6 and 45CSR13. Each applicable rule (and ones that have reasoned non-applicability), and EQT's compliance therewith, will be discussed in detail below.

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

The line heaters (S001-S010) have been determined to meet the definition of a "fuel burning unit" 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 unit is less than 10 mmBtu/hr, it is 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 unit (and the use of natural gas as fuel) should keep the opacity of the unit well below 10% during normal operations.

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. EQT has two (2) enclosed combustors at the facility. The flare is subject to section 4, emission standards for incinerators. The flare has an allowable emission rate of 0.65 pounds of particulate matter per hour (assuming a natural gas density of 0.044 lb/ft³). The flare has negligible amounts of particulate matter emissions per hour. Therefore, the facility's flare should demonstrate compliance with this section. The facility will demonstrate compliance by maintaining records of the amount of natural gas consumed by the flare and the hours of operation. The facility will also monitor the flame of the flare and record any malfunctions that may cause no flame to be present during operation.

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 construction of the OXF-157 natural gas production facility does not have a potential to emit a regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY. However, due to the proposed enclosed combustors, the facility will be subject to 45CSR6, a substantive requirement. Therefore, pursuant to §45-13-2.24, the facility is defined as a “stationary source” under 45CSR13. Pursuant to §45-13-5.1, “[n]o person shall cause, suffer, allow or permit the construction . . . and operation of any stationary source to be commenced without . . . obtaining a permit to construct.” Therefore, EQT is required to obtain a permit registration under 45CSR13 for the construction and operation of the natural gas production facility.

As required under §45-13-8.3 (“Notice Level A”), EQT placed a Class I legal advertisement in a “newspaper of general circulation in the area where the source is . . . located.” The ad ran on November 25, 2014 in *The Herald Record*.

45CSR22 *Air Quality Management Fee Program*

The OXF-157 Facility is not subject to 45CSR30. The facility is subject to 40CFR60 Subpart OOOO, 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, therefore, the facility is not subject and will pay its annual fees through the Rule 22 program.

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

Subpart OOOO applies to facilities that commence construction, reconstruction, or modification after August 23, 2011 (October 15, 2012 for well completions). Since the OXF-157 pad will begin operation after August 23, 2011 it is subject to the requirements of Subpart OOOO. The tanks at the OXF-157 facility will utilize a flare, therefore the tanks will not have the potential to emit more than 6 tpy of VOC’s, therefore the tanks will not be subject to the rule. The site will also include pneumatic controllers that were ordered and installed after August 23, 2011 with a bleed rate equal to or less than 6 scfd, therefore the controllers will not be subject to the applicable provisions of Subpart OOOO. The gas wells at the OXF-157 pad will also be affected facilities subject to Subpart OOOO.

Non Applicability Determinations

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

Pursuant to the exemption given under §45-10-10.1, as the MDHI of the line heaters (S001-S010) are less than 10 mmBtu/hr, the units are not subject to the substantive sections of 45CSR10.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration.

The facility-wide potential-to-emit of the OXF-157 natural gas production facility is below the levels that would define the source as "major" under 45CSR14 and, therefore, the construction evaluated herein is not subject to the provisions of 45CSR14.

Classifying multiple facilities as one "stationary source" under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of "Building, structure, facility, or installation" as given in §45-14-2.13 and §45-19-2.12. The definition states:

"Building, Structure, Facility, or Installation" means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

OXF-157 shares the same SIC code as several other well pads owned by EQT in the area. Therefore, the potential classification of the OXF-157 facility as one stationary source any other facility depends on the determination if these stations are considered "contiguous or adjacent properties."

"Contiguous or Adjacent" determinations are made on a case by case basis. These determinations are proximity-based, and it is important to focus on this and whether or not it meets the common sense notion of one stationary source. The terms "contiguous" or "adjacent" are not defined by USEPA. Contiguous has a dictionary definition of being in actual contact; *touching along a boundary or at a point*. Adjacent has a dictionary definition of not distant; nearby; *having a common endpoint or border*.

The OXF-157 natural gas production facility is not located contiguous with, or directly adjacent to any other EQT facility. There are no EQT owned or operated sites within a 1.25 mile radius of the proposed OXF-157 facility.

40 CFR 60 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 (m³) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984.” The largest storage tanks located at the OXF-157 facility are each 16,800 gallons, or 63.5 m³. Therefore, Subpart Kb does not apply to any of the storage tanks.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the OXF-157 natural gas production 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 (PM₁₀), Particulate Matter less than 2.5 microns (PM_{2.5}), and Sulfur Dioxide (SO₂). 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. EQT included the following HAPs as emitted in substantive amounts in their emissions estimate: Benzene, n-Hexane, Toluene, and Trimethylpentane. The following table lists each HAP’s carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

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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 |
| Xylene | VOC | No | Inadequate Data |
| Trimethylpentane | 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

The estimated maximum emissions from the proposed OXF-157 natural gas production facility are less than applicability thresholds that would define the proposed facility as a "major stationary source" under 45CSR14 and, therefore, no air quality impacts modeling analysis was required. Additionally, based on the nature of the proposed construction, modeling was not required under 45CSR13, Section 7.

MONITORING OF OPERATIONS

The following substantive monitoring, compliance demonstration, and record-keeping requirements (MRR) shall be required:

- For the purposes of demonstrating compliance with maximum limit for the aggregate production of condensate/liquids from the wells set forth in Section 4.0 of the general permit registration, EQT shall be required to monitor and record the monthly and rolling twelve month total of condensate/liquids (in gallons) produced in the wells. Monitoring and recording the monthly and rolling twelve month total of condensate/liquids (in gallons) unloaded from the storage tanks can be used to show compliance with this requirement.

- For the purposes of demonstrating compliance with visible emissions limitations set forth in Section 7.0 of the G70-A general permit, EQT shall be required to:
 - (1) Conduct an initial Method 22 visual emission observation on the line heaters to determine the compliance with the visible emission provisions. EQT shall be required to take a minimum of two (2) hours of visual emissions observations on the line heaters.
 - (2) Conduct monthly Method 22 visible emission observations of the heater treater stack to ensure proper operation for a minimum of ten (10) minutes each month the line heaters are in operation.
 - (3) In the event visible emissions are observed in excess of the limitations given under Section 7.5 of the G70-A general permit, EQT shall be required to take immediate corrective action.
- EQT shall be required to maintain records of all visual emission observations pursuant to the monitoring required under Section 7.2 of the G70-A general permit including any corrective action taken.
- EQT shall be required to report any deviation(s) from the allowable visible emission requirement for any emission source discovered during observations using 40CFR Part 60, Appendix A, Method 9 or 22 to the Director of the Division of Air Quality as soon as practicable, but in any case within ten (10) calendar days of the occurrence and shall include at least the following information: the results of the visible determination of opacity of emissions, the cause or suspected cause of the violation(s), and any corrective measures taken or planned.
- EQT shall be required to maintain records of the amount of natural gas burned in all engines, heaters or other fuel burning units.

RECOMMENDATION TO DIRECTOR

Information supplied in the registration application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that general permit registration G70-A112 for the construction of a natural gas production facility near West Union, Doddridge County, be granted to EQT Production Company.



Roy F. Kees, P.E.
Engineer - NSR Permitting



DATE

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