



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3019
Plant ID No.: 017-00041
Applicant: EQT Production Company
Facility Name: OXF-149 Pad
Location: Doddridge County
NAICS Code: 213111
Application Type: Construction
Received Date: November 16, 2012
Engineer Assigned: Steve R. Pursley, PE
Fee Amount: \$1,000.00
Date Received: December 27, 2012
Complete Date: January 23, 2013
Due Date: April 23, 2013
Applicant Ad Date: November 20, 2012
Newspaper: *The Herald Record*
UTM's: Easting: 517.2 km Northing: 4,341.3 km Zone: 17
Description: Well production support equipment

DESCRIPTION OF PROCESS

EQT Production Company (EQT) has submitted a permit application for the after-the-fact construction and operation of a natural gas production facility primarily consisting of one (1) 0.77 mmBtu/hr natural gas-fired line heaters (S0011), nine (9) 8,820-gallon condensate storage tanks (S001 through S009), and one (1) 0.013 mmBtu/hr natural gas-fired thermoelectric generator (S0015). Truck loading of condensate will also take place at the site. The facility began operation in January 2011. The well pad consists of three wells, each with the same basic operation.

When in production, raw gas from the wells pass through a separator where the condensate is removed from the gas and sent to one of three storage tanks. Gas passing through the separator will be sent to pipeline for transportation. The line heater shall be

used to keep the lines at the facility from freezing and to promote gas/liquids flow.

From the storage tanks, condensate is loaded into trucks for removal from the site. Emissions from the truck loading are uncontrolled but the permit will require mitigation by using pipe racks and submerged fill methods. The thermoelectric generator is used to provide small amounts of electricity for switching/monitoring purposes when the facility is unable to generate sufficient solar power.

SITE INSPECTION

A site inspection of the facility was performed by the writer on December 11, 2012. To get to the well pad from Charleston take I-77 north to exit 176. Go east on US Route 50 approximately 40.6 miles. Take a right on Arnolds Creek Road (Co. Rt. 11). Go approximately 0.7 miles and turn left on Punkin Center Road (Co. Rt. 11/4) (Note google maps calls this "Left Fork Run Rd" but signage says "Punkin Center Road"). Then go approximately 3.3 miles (road turns to dirt after 3.1 miles) and veer left to an access gate. After going through gate go 0.4 miles on the access road. At that point the road turns hard to the left with a split going up a steep hill on the right. Take the steep hill and go approximately 0.3 miles to the well pad. GPS coordinates taken at the site are 39° 13.3' North and 80° 48.0' West. The nearest residence is located along Punkin Center Road at the end of the paved section, approximately 1.1 mile from the Pad as the crow flies. There is also what appears to be a hunting cabin on the well pad side of the gate. It is approximately 0.4 miles from the well pad.

The following is a picture of the OXF-149 well-pad taken on the day of the inspection:



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ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

EQT included in Attachment N of the permit application air emissions calculations for the equipment and processes at the OXF-149 natural gas production facility. The following will summarize the calculation methodologies used by EQT to calculate the potential-to-emit (PTE) of the proposed facility.

Gas-Fired Line Heaters/Thermoelectric Generator

Criteria Pollutant emissions from the natural gas-fired line heater (E10) and the thermoelectric generator (E011) 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.

Storage Tanks

Working and breathing emissions from the ten condensate/produced water storage tanks were based on the TANKS 4.09d program as provided under AP-42, Section 7. Emissions from flashing in the tanks were calculated using CHEMCAD - a chemical process simulation software. Input and summary sheets for both programs were included in the permit application. An aggregate annual throughput of 448,308 gallons of condensate/liquid was used in the calculations for storage tanks S01-S03. An aggregate annual throughput of 0 gallons of condensate/liquid was used in the calculations for storage tanks S04-S06 (Working and breathing losses for all tanks are conservatively calculated based on the maximum monthly throughput at any well at the pad. Although Well 513136 had no throughput during the years for which data is available, other wells at the pad had throughput. Therefore, working and breathing losses were considered for the well but flashing was not considered). An aggregate annual throughput of 325,920 gallons of condensate/liquid was used in the calculations for storage tanks S07-S09. These numbers are based on maximum historic data with a safety factor of 1.2.

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. Note that this table refers to splash loading. However, the permit will require submerged fill loading. Since submerged fill loading will result in lower emissions, the truck loading emissions should be considered very conservative. Additionally, worst-case annual emissions were based on a maximum

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loading rate of 774,228 gal/year of condensate. As no maximum hourly pumping rate was provided, hourly emissions were based on 1,000 hours of loading per year.

Fugitives

EQT based their fugitive equipment leak calculations on emission factors taken from the document EPA-453/R-95-017 - "Protocol for Equipment Leak Emission Estimates." Emission factors were taken from Table 2-4 and no control efficiency, as based on a Leak Detection and Repair (LDAR) protocol, was applied. Emissions of Greenhouse Gases (GHGs) were based on Subpart W of 40 CFR 98 - Federal GHG Reporting Rule.

Haul Roads

EQT included in their application an estimate of fugitive emissions created by truck traffic and employee vehicles at the facility. As all the roadways around the building are unpaved, EQT used the equation given in Section 13.2.2 of AP-42 and appropriate variables to estimate potential emissions.

Emissions Summary

Based on the above estimation methodology, which is determined to be appropriate, the PTE of the OXF-149 natural gas production facility is given in the following tables:

Table 1: Facility-Wide Aggregate Hourly (lb/hr) Criteria Pollutant PTE Summary.

Source	CO	NO _x	PM ⁽¹⁾	SO ₂	VOCs	HAPs
Process Heaters/Generator ⁽²⁾	0.07	0.08	0.01	0.01	0.01	0.01
Tanks	--	--	--	--	14.92	0.61
Fugitive Emissions (component leaks)	--	--	--	--	0.57	0.03
Truck Loading ⁽³⁾	--	--	--	--	2.08	--
Facility-Wide Totals →	0.07	0.08	0.01	0.01	17.58	0.65

- (1) Conservatively, all particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.
- (2) Aggregate emission rate of all such units.
- (3) As a maximum hourly pump rate (and related maximum trucks per hour) was not provided, hourly emissions based on 1,000 hours/year.

Table 2: Facility-Wide Aggregate Annual (tpy) Criteria Pollutant PTE/GHG Summary.

Source	CO	NO _x	PM ⁽¹⁾	SO ₂	VOCs	HAPs	CO _{2e}
Process Heaters/Generator ⁽²⁾	0.28	0.33	0.03	0.01	0.02	0.01	400.92
Tanks	--	--	--	--	65.35	2.67	217.09
Fugitive Emissions (component leaks)	--	--	--	--	2.49	0.10	283.97
Truck Loading	--	--	--	--	1.04	--	--
Facility-Wide Totals →	0.28	0.33	0.03	0.01	68.90	2.78	901.98

- (1) Conservatively, all particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.
 (2) Aggregate emission rate of all such units.

Table 3: Facility-Wide Aggregate Annual (tpy) HAP PTE Summary⁽¹⁾.

Source	Hexane	Benzene	Toluene	Ethyl-benzene	Xylene	Total HAPs
Process Heaters/Generator ⁽²⁾	0.01	--	--	--	--	0.01
Tanks	2.52	0.05	0.07	--	0.03	2.67
Fugitive Emissions	0.04	0.01	--	--	--	0.10
Truck Loading	--	--	--	--	--	--
Facility-Wide Totals⁽³⁾	2.57	0.06	0.07	0.00	0.03	2.78

- (1) As the PTE of all individual HAPs is less than 10 TPY and the PTE of total HAPs is less than 25 TPY, the OXF-149 natural gas production facility is defined as a minor source of HAPs for purposes of 40 CFR 61, 40CFR63, and Title V.
 (2) Aggregate emission rate of all such units.
 (3) Totals may be slightly higher than Table 2 due to rounding.

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, 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 Heater (S0011) has 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 heater is 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.

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-149 natural gas production facility has a potential to emit a regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY and, 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 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 20, 2012 in *The Herald Record* and the affidavit of publication for this legal advertisement was submitted on December 21, 2012.

45CSR22 *Air Quality Management Fee Program*

The facility is not subject to any NSPS, MACT or NESHAP. Additionally, the facility is defined as a minor source under 45CSR30. Therefore the facility is not subject to 45CSR30 and will pay its annual fees through the Rule 22 program.

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 (S005 and S006) 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-149 natural gas production facility (see Table 3 above) 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-149 shares the same SIC code as several other well pads owned by EQT in the area. Therefore, the potential classification of the OXF-149 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-149 natural gas production facility is not located contiguous with, or *directly* adjacent to any other EQT facility. As noted in an email from EQT to the writer, no other facilities are within 0.5 miles.

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-149 facility are each 8,820 gallons, or 34 m³. Therefore, Subpart Kb does not apply to any of the storage tanks.

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-149 pad began operation in January of 2011 it is not subject to the requirements of Subpart OOOO.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the OXF-149 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 Xylenes. The following table lists each HAP’s carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 4: 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 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-149 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 4.1.3 of the draft permit, 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 4.1.2(d) of the draft permit, EQT shall be required to:
 - (1) Conduct an initial Method 22 visual emission observation on the line heater 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 heater.
 - (2) Conduct monthly Method 22 visible emission observations of the line heater 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 4.1.2(d) of the draft 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 4.2.2 of the draft 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.

PERFORMANCE TESTING OF OPERATIONS

The following substantive performance testing requirements shall be required:

- Within sixty (60) days of the issuance date of the draft permit, EQT shall be required to perform, or have performed, an analysis to determine the constituent properties of the condensate (testing done previous to permit issuance deemed to be appropriate by the Director shall be accepted). The analysis shall, at a minimum, include the same components as the analysis used to calculate storage tank emissions in Permit Application R13-3019. Where applicable, if the analysis shows average constituent properties that, when used to calculate emissions in the same manner as submitted in Permit Application R13-3019, result in emissions that are greater than the levels that define a "modification" under 45CSR13, EQT shall be required to, within thirty (30) days of receiving the results of the analysis, submit to the Director an appropriate permit application to increase emissions.

RECOMMENDATION TO DIRECTOR

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Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-3019 for the construction of a natural gas production facility near West Union, Doddridge County, be granted to EQT Production Company.

Steven R. Pursley, PE
Engineer

January 29, 2013

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