



west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475 • FAX: (304) 926-0479

Ear Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: G70-A146
Plant ID No.: 085-00048
Applicant: EQT Production Company
Facility Name: OXF-122 Natural Gas Production Facility
Location: West Union, Ritchie County
NAICS Code: 211111
Application Type: Construction
Received Date: February 3, 2015
Engineer Assigned: William T. Rothwell, P.E.
Fee Amount: \$1500.00
Date Received: February 9, 2015
Complete Date: March 3, 2015
Applicant Ad Date: February 4, 2015
Newspaper: *The Pennsboro News*
UTM's: Easting: 514.6 km Northing: 4,331.5 km Zone: 17
Description: Application for a natural gas well pad consisting of five (5) line heaters, six (6) produced condensate / water storage tanks, one (1) sand trap blowdown tank, two (2) thermoelectric generators, one (1) enclosed combustor 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 five (5) wells pass through sand traps where sediment is removed. Fluids from the sand traps are manually blown down to the sand trap blowdown tank (S016). From the sand traps, the raw gas is routed through the line heaters (S001-S005) 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 produced condensate / water storage tanks (S006-S011). Emissions from the condensate tanks and sand trap blowdown tank are captured and routed the enclosed combustion device (C012) and burnt.

Produced fluids are pumped into a tank truck (S013) on an as-needed basis and are disposed of off-site. Vapors during truck loading will be controlled by the enclosed combustion device (C012).

The two (2) thermoelectric generators (S014 & S015) are operated with natural gas and used to provide electricity to the site.

SITE INSPECTION

On March 11, 2015, Doug Hammel - WVDAQ Enforcement Section conducted an inspection of the OXF-122 natural gas production facility. The OXF-122 site is located in a remote and rural area of Ritchie County. Site work had been completed and both levels of pad were graded and bare, prepped for drilling to begin with no equipment present. The closest residence is estimated is located approximately 1,400 feet away. The site is suitable for G70 permit.

Directions: [Latitude: 39.13226, Longitude: -80.83105]

From US-50, travel S on Sunnyside, CR-50/30 to Oxford Rd, CR-21. Go SW on Oxford Rd/S.Fork Hughes River 5.4 mi to Taylor Drain Rd, Cr-19. Go S on Taylor Drain Rd / Cr-19 for 4.2 miles (past EQT Pierce). Go W on Sugar Run Rd for 1.9 miles. At fork, go S, across bridge, on Summers Rd Brushy Fork for 1.5 miles. At top of hill, access road will be on the Left. Take access road 0.9 miles back to pads, going L at fork (right fork goes to water impound).

AIR EMISSIONS AND CALCULATION METHODOLOGIES

EQT included in Attachment I of the permit application air emissions calculations for the equipment and processes at the OXF-122 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 heaters (E001-E005) and the thermoelectric generators (E015 & E016) 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 1,088 Btu/scf was used in the calculations.

Storage Tanks & Flare

Emissions from working, breathing & flashing in the tanks were calculated using E&P Tanks 2.0. Input and summary sheets for the program were included in the permit application.

As all uncontrolled emissions from the storage tanks are routed to the vapor combustor for control, the controlled emissions from the tanks are based on the vapor combustor's minimum 98% control efficiency. An aggregate annual throughput of 3,877,650 gallons of condensate was used in the calculations the storage tanks.

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 Equation (1) of AP-42 Section 5.2-4. In this equation, EQT used variables specific to the liquids loaded and to the method of loading - in this case "submerged filling - dedicated normal service." Additionally, worst-case annual emissions were based on a maximum loading rate of 3,877,650 gal/year of condensate. The pumping rate was provided as 100 gallons per minute at an average fill time of 42 minutes.

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.

Vapor Combustor

The vapor combustor will receive captured vapors from the storage tanks. The amount of emissions received is determined by the calculation methodologies described above. A 98% control was applied to the uncontrolled VOC/HAP/methane emissions received by the vapor combustor to determine the amount of pass-through emissions of the combustor. The emissions of NO_x, CO, particulate matter, SO₂, and GHGs from the combustion of the vapors were based on emission factors taken from AP-42 Section 1.4 and the maximum design heat input (MDHI) of the unit.

Haul Roads

EQT included in their application an estimate of fugitive emissions created by truck traffic an 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 new equipment at the OXF-122 natural gas production facility is given in the following table:

Emission Unit	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
S001-S005 (5) 1.0 mmBtu/hr Line Heaters (Combined)	Nitrogen Oxides	0.45	2.00
	Carbon Monoxide	0.40	1.70
	Volatile Organic Compounds	0.05	0.10
	Sulfur Dioxide	<0.01	<0.01
	Particulate Matter-10	0.05	0.15
	CO ₂ e	585.50	2,564.45
S006-S011 & S016 Produced Fluid & Blowdown Tanks (Combined)	Volatile Organic Compounds	1.40	6.12
	Total HAPs	0.07	0.30
S013 Truck Loading	Volatile Organic Compounds	0.01	0.05
	Total HAPs	<0.01	<0.01
Combustion Device C012	Nitrogen Oxides	1.07	4.71
	Carbon Monoxide	0.90	3.95
S014-S015 (2) Thermal Electric 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	3.04	13.34
Fugitives	Volatile Organic Compounds	0.09	0.40
	Total HAPs	0.01	0.04

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

Pollutant	Facility Wide Emissions (tons/year)
Nitrogen Oxides	6.73
Carbon Monoxide	5.65
Volatile Organic Compounds	6.63
Particulate Matter-10/2.5	3.15
Sulfur Dioxide	0.04
Total HAPs	0.38
Carbon Dioxide Equivalent	9,739.91

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, 45CSR13, and 40 CFR 60 Subpart OOOO. 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 to S006) each 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 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.

45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse

The purpose of this rule is to prevent and control air pollution from combustion of refuse. EQT has one (1) enclosed combustor 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.

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 Emission of Sulfur Oxides (non-applicability)

Pursuant to the exemption given under §45-10-10.1, as the MDHI of the Line Heaters (S001- S005) are less than 10 mmBtu/hr, the units are not subject to the substantive 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 construction of the OXF-122 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 February 4, 2015 in *The Pennsboro News* and the affidavit of publication for this legal advertisement was submitted on February 20, 2015.

45CSR14 (NON APPLICABILITY)

The facility-wide potential-to-emit of the OXF-122 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.

Potential Source Aggregation

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).

The proposed OXF-122 natural gas production facility will be located approximately 6,800 feet from the known nearest other EQT facility (OXF-44 well-pad and production facility). OXF-44 shares the same SIC code as OXF-122 and is owned by EQT. Therefore, the potential classification of the OXF-122 facility as one stationary source with OXF-44 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-122 natural gas production facility is not located contiguous with, or *directly* adjacent to the OXF-44 facility. As noted above, the facilities are 6,800 feet apart. Facilities separated by this distance do not meet the common sense notion of a single plant. Therefore, the OXF-122 and OXF-44 facilities are not considered to be on contiguous or adjacent property.

45CSR17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter

45CSR17 requires facilities to “prevent and control particulate matter air pollution from materials handling, preparation, storage and other sources of fugitive particulate matter.” Specifically, §45-17-3.2b requires “[a]pplication of . . . water or suitable chemicals on unpaved roads. . . and other surfaces which can create airborne particulate matter.” To meet this requirement, the draft permit, pursuant to 4.1.8, requires EQT to maintain all paved roads/work areas and use a water truck on all unpaved roads/work areas when necessary.

45CSR30: Requirements for Operating Permits - (NON APPLICABILITY)

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The proposed facility does not meet the definition of a "major source under § 112 of the Clean Air Act" as outlined under §45-30-2.26 and clarified (fugitive policy) under 45CSR30b. However, as the facility is subject to a New Source Performance Standard (NSPS) - 40 CFR 60, Subpart OOOO - the facility would, in most cases, be subject to Title V as a “deferred source.” However, pursuant to §60.5370(c), as a non-major “area source,” EQT is not required to obtain a Title V permit for the proposed facility. Therefore, the OXF-122 natural gas production facility is not subject to 45CSR30.

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 - (NON APPLICABILITY)

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-122 facility are each 8,820 gallons, or 33.38 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

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 currently are not regulated at the federal level. 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 has drilled gas wells at the OXF-122 well-pad 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 directed all gas from wells during flowback at the OXF-122 site 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. However, as the site is expected to be in production at that time, the storage tank requirements will be reviewed. 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 or greater. . .” Based on a letter from USEPA to the American Petroleum Institute 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) condensate/produced water storage 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. While not identified, it is assumed the facility will use pneumatic controllers and will be required to meet this requirement.

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the OXF-122 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)):

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-122 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, COMPLIANCE DEMONSTRATIONS, REPORTING, AND RECORDING 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, 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 line heaters 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

The information provided in general permit registration application G70-A146 indicates that compliance with all applicable regulations will be achieved. Therefore, I recommend to the Director the issuance of Permit Registration Number G70-A146 to EQT Production Company for the construction of the OXF-122 natural gas production facility located near West Union, Ritchie County, WV.



William T. Rothwell II, P.E.
Engineer - NSR Permitting

05/01/2015

Date