



**west virginia department of environmental protection**

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**ENGINEERING EVALUATION / FACT SHEET**

**BACKGROUND INFORMATION**

Application No.: G70-A031A  
Plant ID No.: 017-00040  
Applicant: EQT Production Company (EQT)  
Facility Name: OXF-150 Pad  
Location: Doddridge County  
NAICS Code: 211111  
Application Type: Class II Administrative Update  
Received Date: June 2, 2015  
Engineer Assigned: David Keatley  
Fee Amount: \$1,500  
Date Received: July 7, 2015  
Complete Date: September 23, 2015  
Due Date: November 7, 2015  
Applicant Ad Date: July 14, 2015  
Newspaper: *The Herald Record*  
UTM's: Easting: 518.0 km Northing: 4,341.6 km Zone: 17  
Description: Installation and operation of: two (2) 1.54-mmBtu/hr line heaters, two (2) 140-bbl sand separator tanks, increase in produced water throughput, and an increase in condensate throughput. Removal of: six (6) 210-bbl storage tanks and one (1) 0.77-mmBtu/hr line heater.

**DESCRIPTION OF PROCESS**

This facility is a natural gas production facility. Raw natural gas from twelve (12) natural gas wells goes to sand separators. The liquid and sand from the sand separators is sent to two (2) 140-bbl sand separator tanks. The gas from the sand separators is then heated by one (1) 0.77-mmBtu/hr line heater and seven (7) 1.54-mmBtu/hr line heaters. After the gas is heated by the line heaters it is passed through a separator. The natural gas from the separator exits the facility via pipeline. The liquid is sent to twelve (12) 400-bbl produced liquid tanks which is controlled by two (2) 11.66-mmBtu/hr 48" LEED enclosed combustors. Produced liquids will exit the facility at a maximum rate of

17,725,680 gallons per year via trucks and be controlled with vapor return. Four (4) 0.013-mmBtu/hr thermoelectric generators are used to provide electricity to the facility.

## SITE INSPECTION

A site inspection of the facility was performed by the Steve Pursley 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 0.5 miles and cross a stream on the access road. After crossing the stream continue approximately 1.1 miles to the well pad. GPS coordinates taken at the site are 39° 13.4' North and 80° 47.5' West. The nearest residence is located along Punkin Center Road at the end of the paved section, approximately 1.0 mile from the Pad. There is also what appears to be a hunting cabin just west of the well pad. It is approximately 2,000 feet from the well pad.

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Line Heaters: Potential emissions from the line heater 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, General Stationary Fuel Combustion Sources, Tables C-1 and C-2. Maximum heat input used to calculate emissions was 1.54 MMBtu/hr.

Storage Tanks: VOC and HAPs from the produced liquid tanks are calculated using EPA TANKS Version 4.0.9d and E&P Tanks. Vapors of VOC and HAPs flashing from the storage tanks are calculated using E&P Tanks v2.0 which uses Peng-Robinson equation of state. For the flash emissions the highest throughput on record (21,858 bbl/day and 1,402 bbl/day) and a 50% increase were used to estimate emissions (assuming 1% efficiency for the three-way separator). Emissions from the two (2) vapor combustors will be estimated using a 95% control efficiency for the vapors from the tanks, AP-42 for the combustion emissions, and 40 CFR 98 for the GHG emissions.

Fugitive Equipment Leaks: Emissions from leaking equipment components have been estimated using facility estimated component counts and types along with Table 2-4: Oil & Gas Production Operations Average Emission Factors, Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995. Emission factors used are based on average measured total organic carbon (TOC) from component types indicated in gas service at O&G Production operations. Greenhouse gas emission from component leaks are calculated according to the procedures in 40 CFR 98 Subpart W, Petroleum and Natural Gas Systems, Section 98.233(r), Population Count and Emission Factors.

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**Tank Truck Loadings:** Emissions of VOC and HAPs from the loading of organic liquids from storage tanks to tank truck are calculated using U.S. EPA's AP-42 Chapter 5 Section 2 factors, Transportation and Marketing of Petroleum Liquids, June 2008. The emissions were calculated using a condensate sample from a representative well #512441 on the OXF131 pad. Maximum throughput used to estimate emissions from the tank truck loading area is 17,725,680 gallons per year. The capture efficiency used was 70% and the destruction efficiency was 95%.

**Table 1: Modified Maximum Controlled PTE**

Emission Points	Emission Unit	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
C001	Vapor Combustor  (Controlling: S001-S012, S033, and S036)	Nitrogen Oxides	1.11	4.87
		Carbon Monoxide	0.93	4.09
		Volatile Organic Compounds	1.69	7.41
		Sulfur Dioxide	0.01	0.03
		Particulate Matter-10	0.08	0.37
		CO <sub>2</sub> e	1,385	6,065
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		CO <sub>2</sub> e	1,385	6,065
E034 and E035	Line Heaters S034 and S035  (Emissions per Each)	Nitrogen Oxides	0.15	0.64
		Carbon Monoxide	0.12	0.54
		Volatile Organic Compounds	0.01	0.04
		Particulate Matter-10	0.01	0.05
		CO <sub>2</sub> e	180	790

E033	Sand Separator Tanks (S033) Emissions per Each	Volatile Organic Compounds	0.08	0.35
E037	Uncaptured Truck Loading (S036)	Volatile Organic Compounds	0.10	0.46

Table 2: Summarized Estimated Maximum Controlled Regulated Facility Wide PTE

Pollutant	Maximum Annual Facility Wide Air Emissions (tons/year)
Nitrogen Oxides	15.87
Carbon Monoxide	13.33
Volatile Organic Compounds	28.65
Total Particulate Matter	20.97
PM <sub>10</sub>	6.13
Sulfur Dioxide	0.10
Benzene	0.02
Toluene	0.03
Xylenes	0.02
n-Hexane	0.63
Trimethylpentane (2,2,4-)	0.17
Total HAP Emissions	0.87
CO <sub>e</sub>	21,068

## REGULATORY APPLICABILITY

The following rules and regulations apply to this facility:

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

The proposed Line Heaters (S034 and S035) 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 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 will consist of two (2) vapor combustors for controlling the working/breathing/flashing emissions from the condensate/produced water storage tanks. The vapor combustors 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

VOC emissions to the incinerators are 500 lbs/hr maximum or 0.25 tons/hr, each.

$$\text{Emissions (lb/hr)} = 5.43 \times 0.25 \text{ tons/hr} = 1.36 \text{ lb/hr}$$

The hourly particulate matter emission rate from each combustor is 0.09 lb/hr. The facility's proposed combustors should meet the emission

requirements of this rule. The facility will demonstrate compliance by maintaining and operating the combustors properly.

The vapor combustors 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.

#### **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 (GPU-1 and GPU-2) 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, Permission to Commence Construction, and Procedures for Evaluation**

The facility has the potential to emit greater than 6 lb/hr and 10 tpy of VOC (uncontrolled) from the storage tanks and requires a permit. This facility qualifies for a Class II Administrative Update because the increase in emissions was below regulator thresholds for all regulated pollutants.

#### **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 this facility is exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71. This facility has maximum horsepower capacity less than 1,000 hp and is a 9M source and is required to pay the \$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**

This subpart applies to the applicable provisions of this subpart if you are the owner or operator of one or more of the onshore affected facilities listed in paragraphs (a) through (g) of this section for which you

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commence construction, modification or reconstruction after August 23, 2011.

- (a) Each gas well affected facility, which is a single natural gas well.

*The pad consist of (12) twelve natural gas wells. The wells were constructed after the August 23, 2011 applicability date. The construction of the facility will begin after that date. Therefore, the gas wells located at the facility will be subject to the requirements of this subpart.*

- (b) (1) *For the oil production segment (between the wellhead and the point of custody transfer to an oil pipeline), 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.*
- (2) *For 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.*
- (3) *For natural gas processing plants, each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller.*

*The facility will utilize pneumatic devices at the site. The facility has stated that the natural gas bleed rate will not exceed 6 scfh. Therefore, the facility is not subject to the requirements of this subpart.*

- (c) *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 kilpascals and without emissions to the atmosphere.*

*This regulation 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.*

*The facility is proposing eighteen (18) condensate storage vessels at the wellpad. These (18) eighteen condensate storage vessels are considered Group 2 storage vessels. Group 2 storage vessels means a storage vessel is constructed after April 12, 2013. The facility has estimated uncontrolled emissions from the storage vessels and each storage vessels emissions exceed an emission rate of 6 tpy. The facility is proposing to install two (2) enclosed vapor combustors onsite to control emissions from the storage vessels. The vapor combustors will have a control efficiency of 95%, each. Since the facility is proposing to install vapor combustors to control VOC emissions from the storage vessels and obtain a federally enforceable limit in their permit, the facility will not be required to reduce emissions by 95% or greater within 60 days of startup, as required by this regulation. Controlled VOC emissions from the tanks will be less than 6 tpy (each), therefore, the facility is not required by this subpart to reduced emissions further.*

*The following Regulations Do Not Apply to This 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**

*The affected facility to which this subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters (19,813 gallons) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984.*

*The facility is proposing the construction of (10) ten 400 bbl (16,800 gallons) condensate storage tanks. The condensate is considered a VOC. Since the capacity is below the volume specified in the regulation, this regulation doesn't apply.*

**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 been using at this facility 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.

**TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS**

*There will be small amounts of various non-criteria regulated pollutants emitted from the combustion of natural gas. Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NOx), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM10), Particulate Matter less than 2.5 microns (PM2.5), 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 in the Regulatory Applicability section.*

*The majority of the non-criteria pollutants emitted by EQT's OXF-150 Pad fall under the definition of HAPs. HAPs are identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause*

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cancer or other serious human health effects. EQT's OXF-150 Pad will emit the following HAPs in substantive amounts ( $\geq 0.01$  tpy). In addition, the following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

**OXF-150 Pad 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
Trimethylpentane (2,2,4-)	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 <http://www.epa.gov/iris/>.

RECOMMENDATION TO DIRECTOR

The information provided in this 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 for a Class II Administrative Update is recommended to the Director of Air Quality.



David Keatley  
Permit Writer - NSR Permitting

September 23, 2015

Date

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