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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	G70-A170
Plant ID No.:	017-00050
Applicant:	EQT Production Company (EQT)
Facility Name:	WEU-2
Location:	Doddridge County
NAICS Code:	211111
Application Type:	Modification
Received Date:	July 17, 2015
Engineer Assigned:	David Keatley
Fee Amount:	$1,500
Date Fee Received:	July 28, 2015
Complete Date:	December 2, 2015
Due Date:	January 16, 2015
Applicant Ad Date:	July 21, 2015
Newspaper:	*The Herald Record*
UTM's:	Easting: 519.7 km Northing: 4,347.0 km Zone: 17
Description:	Installation and operation of: twelve (12) 400-bbl condensate tanks, four (4) 1.54-mmBtu/hr line heaters, one (1) 140-bbl sand separator tank, one (1) 0.013-mmBtu/hr thermoelectric generator, one (1) 11.66-mmBtu/hr enclosed combustor. Removal of twenty-one (21) condensate tanks.

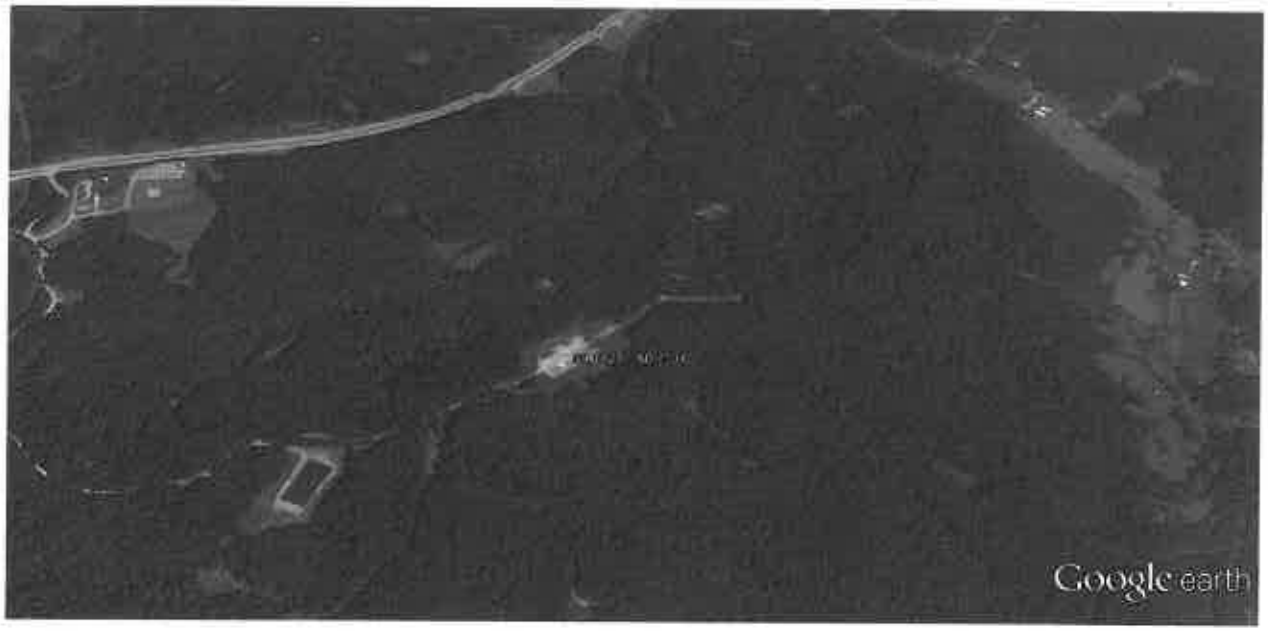
DESCRIPTION OF PROCESS

This facility is natural gas production facility. This facility will consist of eleven (11) natural gas wells (four additional). The incoming gas stream from the underground well will pass through sand separator(s). The sand and water go to one (1) 140-bbl sand separator tank. The sand separator's vapors will be controlled by two (2) LEED 48" enclosed combustors (C001 and C002). The gas from the sand separator will go to eleven (11) 1.54-mmBtu/hr line heaters which will heat the gas to encourage separation of states and sent to a separator. The gas from the separator exits the facility via pipeline. The

liquid from the separator are sent to twelve (12) 400-bbl condensate tanks. Vapors from the condensate tanks are controlled by C001 and C002. Condensate will be trucked off site. Truck loading will be controlled by vapor return. Three (3) 0.013-mmBtu/hr thermoelectric generator (TEG) will provide electrical power to the facility.

SITE INSPECTION

On July 1, 2014, James Robertson, from DAQ's Permitting Section, conducted a site inspection of the facility. The facility was deemed in compliance.



ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Line Heaters and TEGs: Potential emissions from the line heater and TEGs 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.

Storage Tanks: Emissions of VOC and HAPs working and breathing losses from the condensate tanks and sand separator tank at the facility are calculated using EPA TANKS Version 4.0.9d. Emissions for VOC and HAPs from flashing of the liquids in the condensate tanks and sand separator tank are calculated using a chemical simulation software (E&P Tanks) using the Peng-Robinson equations of state. Emissions from the enclosed combustors were estimated with 100% capture efficiency and 95% destruction efficiency.

Fugitive Equipment Leaks: Emission of VOC and HAPs 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.

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.

Haul Roads: Fugitive dust emitted from facility roadways has been estimated using projected vehicle miles traveled along with U.S. EPA's AP-42 factors for unpaved haul roads.

Table 1: Estimated New/Modified Maximum Controlled PTE

Emission Point ID	Emission Unit ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
E044-E047	S044-S047	Line Heaters 1.54 mmBtu/hr (Air Emissions from Each)	Nitrogen Oxides	0.14	0.62
			Carbon Monoxide	0.12	0.52
			Volatile Organic Compounds	<0.01	0.03
			PM	0.01	0.05
			PM_{10}	0.01	0.05
			CO_2e	181	790
E048	S048	Thermoelectric Generators	CO_2e	2	7

C001	Condensate Tanks (S031-S042, S043, and S049)	LEED 48" Combustor (Produced Liquid Tanks, Truck Loading, and Sand Tank) 11.66 mmBtu/hr	Nitrogen Oxides	0.95	4.18
			Carbon Monoxide	0.80	3.51
			Volatile Organic Compounds	6.24	27.32
			Total Particulate Matter	0.07	0.32
			Benzene	0.01	0.03
			Ethylbenzene	0.01	0.05
			Xylenes	<0.01	0.01
			n-Hexane	0.22	0.96
			CO_2e	1,543	6,757
C002	Condensate Tanks (S031-S042, S043, and S049)	LEED 48" Combustor (Produced Liquid Tanks, Truck Loading, and Sand Tank) 11.66 mmBtu/hr	Nitrogen Oxides	0.95	4.18
			Carbon Monoxide	0.80	3.51
			Volatile Organic Compounds	6.24	27.32
			Total Particulate Matter	0.07	0.32
			Benzene	0.01	0.03
			Ethylbenzene	0.01	0.05
			Xylenes	<0.01	0.01
			n-Hexane	0.22	0.96
			CO_2e	1,543	6,757
E049	Condensate Tanks	Tank Truck Loading (uncaptured)	Volatile Organic Compounds	0.48	2.08

Table 2: Summarized Estimated Maximum Controlled Regulated Facility Wide Air Emissions

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	12.90
Carbon Monoxide	10.84
Volatile Organic Compounds	83.64
Total Particulate Matter	42.99
PM_{10}	11.69
Sulfur Dioxide	0.08
Benzene	0.08
Toluene	0.14
Xylenes	0.03
n-Hexane	2.40
Total HAP Emissions	2.96
CO_2e	21,372

REGULATORY APPLICABILITY

The following rules and regulations apply to the facility.

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

This rule primarily establishes emission limitations for smoke and particulate matter which are discharged from fuel burning units.

EQT is proposing to install four (4) 1.54-MMBtu/hr line heaters (S44-S47) and one (1) 0.013-mmBtu/hr thermoelectric generator (S48) which have been determined to meet the definition of a "fuel burning unit"s under 45CSR2 . Since the maximum design heat input of the emission units are less than 10 mmBtu/hr, they are exempt to sections 4, 5, 6, 8 and 9 of 45CSR2. These emission units will be subject to the opacity requirements set forth in section §45-2-3 of this rule.

Pursuant to 45CSR2, Section 3.1, these emission units are subject to an opacity limit of 10%. The facility will demonstrate compliance with this rule by conducting monthly visible emission checks in accordance with 40 CFR 60, Appendix A, Method 9 or by using measurements from continuous opacity monitoring systems approved by the Director, at the request of the Director.

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 rule is designed to prevent and control the discharge of 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 has one (1) proposed enclosed combustor and one (1) modified enclosed combustor for controlling the working/breathing/flashing emissions from the condensate tanks. The enclosed 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 incinerator are 500 lbs/hr.

Emissions (lb/hr) = 5.43 x 0.25 tons/hr = 1.36 lb/hr

The estimated hourly particulate matter emission rate from the combustors are 0.07 lb/hr each which is less than the allowable limit and should meet the emission requirements of this rule.

The enclosed combustor 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

The primary purpose of this rule is to prevent and control air pollution from the emission 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 (S044 through S048) 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 uncontrolled VOC PTE exceeds the thresholds of 6 lb/hr and 10 tons/year and therefore this facility requires a permit.

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 is not a natural gas compressor station and is a 9M source and is required to pay a $200 annual fee. EQT is required to keep their Certificate to Operate current.

The following rules and regulations do not apply.

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 proposes installing twelve (12) 400-bbl condensate tanks. Since the capacity of these tanks is below the volume threshold in the regulation, this regulation doesn't apply to this 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 enclosed combustors that EQT has proposed/modified are 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.

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

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

The gas wells were constructed in May 2011. This is before the August 23, 2011 applicability date set forth in this subpart. Therefore, the facility is not subject to the requirements of this subpart. If the facility decides to drill more wells they are aware they will be subject to the requirements of this subpart.

(b) *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.*

This facilities pneumatic controllers were ordered and installed after August 23, 2011. However all pneumatic controllers do not meet the definition of single continuous bleed natural gas driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh and therefore this facility is not subject to this section of this regulation.

(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 rule 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.

EQT has proposed installing ten (10) 400-bbl condensate storage vessels at the wellpad. It is stated in the application that all the storage vessels were constructed prior to August 23, 2011. In addition, all the storage vessels emissions are captured and controlled by an enclosed combustor with a 95% control efficiency. Therefore, the storage tanks would still not be subject to the requirements of this section of this regulation, since the facility has added an enclosed combustor to reduce emissions.

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, 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 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 to construct and operate their natural gas production facility WEU2 is recommended to the Director of Air Quality.

David Keatley

David Keatley
Permit Writer - NSR Permitting

December 2, 2015

Date