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

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

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	G70-B201
Plant ID No.:	095-00068
Applicant:	EQT Production Company (EQT)
Facility Name:	SHR-60 Site
Location:	Near Shirley, Tyler County, West Virginia
NAICS Code:	211111
Application Type:	Construction
Received Date:	February 25, 2016
Engineer Assigned:	David Keatley
Fee Amount:	$1,500
Date Received:	March 8, 2016
Complete Date:	March 30, 2016
Due Date:	May 14, 2016
Applicant Ad Date:	March 9, 2016
Newspaper:	Tyler Star News
UTM's:	Latitude: 39.39473 Longitude: -80.81124
Description:	Installation and operation of: ten (10) 1.54-mmBtu/hr line heater, ten (10) 400-bbl produced liquid tanks, one (1) 140-bbl sand blowdown tank, two (2) 11.66-mmBtu/hr enclosed combustors, three (3) 0.013-mmBtu/hr thermoelectric generators, one 110-bhp natural gas compressor engine, and one (1) 0.75-mmBtu/hr line heaters.

DESCRIPTION OF PROCESS

Raw natural gas from ten (10) natural gas wells will flow through ten (10) sand traps. The liquid from the sand traps is sent to one (1) 140-bbl sand blowdown tank S021. The vapors from the sand blowdown tank will be controlled by two (2) 11.66-mmBtu/hr LEED 48" enclosed combustors (C022 or C023). The gas from the sand traps is then heated by ten (10) 1.54-mmBtu/hr line heaters (S001 through S010) to encourage phase separation and is sent to separators. The gas from the separators exits the facility via gas sales pipeline. The liquid from the separators is sent to one (1) 0.75-mmBtu/hr line heater

(S030) and is sent to a low-pressure separator to encourage phase separation. The gas from the low-pressure separator is compressed and exit the facility via gas sales pipeline. The compressor is powered by one (1) four-stroke rich-burn 110 hp Ford CSG-637 natural gas fired reciprocating internal combustion engine (RICE) S029. Liquids from the low-pressure separator goes to ten (10) 400-bbl produced liquid tanks (S011 through S020). Working, breathing and flashing vapors will be controlled by two (2) 11.66-mmBtu/hr enclosed combustors (C022 or C023).

The produced liquid will be trucked S024 off-site at a maximum rate of 22,551,900 gallons/year. The vapor during truck will be controlled with vapor return. Three (3) 0.013-mmBtu/hr thermoelectric generators (S025 through S027) will be operated to provide electrical power to the facility.

SITE INSPECTION

From US 50 take Tarklin Road exit. Take immediate left and travel for approximately 0.2 miles to CR 3 (Big Flint Road). Travel on CR 3 for approximately 11.8 miles until you reach CR 23. Turn left onto CR 23 and travel approximately 4.3 miles until you reach CR 60 (Pratts Run). Travel on CR 60 for approximately 1.55 miles until you reach CR 60/1 (Jefferson Run). Travel for approximately 0.4 miles up the hill to the access road which is on the right.

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.

Enclosed Combustors (Controlling Storage Tanks and Truck Loading): Emissions from working, breathing, and flashing of the liquids in the produced liquid tanks & sand separator tank were calculated using a representative gas sample in ProMax 3.2. The enclosed combustors will have a minimum control efficiency of 98%.

Truck loading with vapor return was estimated with a 70% capture efficiency and 98% destruction efficiency. Truck loading was estimated with equation from AP-42 Chapter 5 for splash fill.

Engine: Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C. NOx, CO, and VOCs were estimated with manufacturer emission factors other emissions were estimated with AP-42 emission factors.

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)
E001-E010	S001-S010	Line Heaters 1.54 mmBtu/hr (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	0.01
			PM_{10}	<0.01	0.01
			CO_2e	181	790
E025 through E027	S025 through S027	Thermoelectric Generators (Emissions from each)	CO_2e	2	7
E029	S029	Engine Ford CSG-637 110-bhp	Nitrogen Oxides	0.24	1.03
			Carbon Monoxide	0.49	2.14
			Volatile Organic Compounds	0.16	0.71
			Total Particulate Matter	0.01	0.04
			Formaldehyde	0.01	0.06
			CO_2e	96	420
E030	S030	Line Heater 0.75 mmBtu/hr	Nitrogen Oxides	0.07	0.30
			Carbon Monoxide	0.06	0.25
			Volatile Organic Compounds	<0.01	0.02
			CO_2e	88	385

C022	S011-S020, S021, S024, and C022	LEED 48" Enclosed Combustor (Controlling: Produced Liquid Tanks, Sand Tank, and Truck Loading) 11.66 mmBtu/hr	Nitrogen Oxides	1.07	4.71
			Carbon Monoxide	0.90	3.95
			Total Particulate Matter	0.08	0.36
			Sulfur Dioxide	0.01	0.03
			Volatile Organic Compounds	1.13	4.66
			n-Hexane	0.05	0.23
			CO_2e	1,392	6,094
C023	S011-S020, S021, S024, and C023	LEED 48" Enclosed Combustor (Controlling: Produced Liquid Tanks, Sand Tank, and Truck Loading) 11.66 mmBtu/hr	Nitrogen Oxides	1.07	4.71
			Carbon Monoxide	0.90	3.95
			Total Particulate Matter	0.08	0.36
			Sulfur Dioxide	0.01	0.03
			Volatile Organic Compounds	1.13	4.66
			n-Hexane	0.05	0.23
			CO_2e	1,392	6,094
E024	S024	Tank Truck Loading (uncaptured)	Volatile Organic Compounds	0.04	0.18

Table 2: Summarized Estimated Maximum Controlled Regulated Facility Wide PTE

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	16.94
Carbon Monoxide	15.51
Volatile Organic Compounds	11.42
Total Particulate Matter	13.78
Sulfur Dioxide	0.06
Formaldehyde	0.06
n-Hexane	0.56
Total HAP Emissions	0.78
CO_2e	20,976

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 rules establishes emission limitations for smoke and particulate matter which are discharged from fuel burning units. Per §45-2-11, any fuel burning unit(s) having a heat input under ten (10) million Btu/hr will be exempt from sections 4, 5, 6, 8 and 9. The following emission units are subject to this rule, but are less than 10 mmBtu/hr and are exempt to the aforementioned sections of this rule: S001-S010, S025 - S027, and S030. The fuel buring units will be subject to the opacity requirements set forth in section §45-2-3 of this rule.

The facility will demonstrate compliance with this rule by conducting monthly visible emission checks in accordance with 40 CFR 60, Appendix A, Method 9 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 proposed an enclosed combustor for controlling the working/breathing/flashing emissions from the condensate/produced water storage tanks. The enclosed combustor 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

Emissions to the incinerator are 245 lbs/hr.

Emissions (lb/hr) = 5.43 x 0.13 tons/hr = 0.67 lb/hr

The estimated hourly particulate matter emission rate from the combustor is 0.06 lb/hr. The facility's proposed enclosed combustor should meet the emission requirements of this rule. The facility will demonstrate compliance by maintaining and operating the combustor properly.

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. The permittee will be required to operate the enclosed combustor according to manufacturer specifications in order to maintain a smokeless operation. The permittee will also be required to conduct Method 9 opacity checks upon request of the Director.

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 following fuel buring emission units: S001-S010, S025 - S027, and S030 are below individual heat input of all of the proposed fuel burning units of 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*

This facility exceeds the 6 lb/hr and 10 tons/year thresholds to require 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 they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71. This facility is not a natural gas compressor station and is a 9M source which is required to pay a $200 annual fee. EQT is required to keep their Certificate to Operate current.

40CFR60 Subpart OOOO *Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution*

EPA published in the Federal Register new source performance standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 2012. 40CFR60 Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The following affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this subpart:

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

The ten (10) natural gas wells were drilled principally for the production of natural gas and condensate and were done so after August 23, 2011. Therefore, these wells would be considered affected facilities under this subpart. The compliance date for these hydraulically fractured wells is October 15, 2012.

Antero is required under §60.5410 to submit an initial notification, initial annual report, maintain a log of records for each well completion, and maintain records of location and method of compliance. §60.5420 requires Antero demonstrate continuous compliance by submitting reports and maintaining records for each completion operation.

b. 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 kilopascals 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.

Produced liquid tanks and sand separator tank (S011 through and S021) located at this facility are estimated to emit less 6 tpy of VOC per tank controlled. Therefore this facilities tanks are not subject to this section of this regulation.

The following rules and regulations do not apply to the 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 is not used to comply with one of these regulations. The purpose of the enclosed combustor is to control emissions from the tanks that are routed to it. In addition 40CFR60.18 refers to flares but makes no mention of enclosed combustion devices. Therefore this facility is not subject to this regulation.

40CFR60 Subpart Kb *Standards of Performance for VOC Liquid Storage Vessels*

40CFR60 Subpart Kb does not apply to storage vessels with a capacity less than 75 cubic meters. All proposed tanks at this facility are less than 75 cubic meters; therefore this facilities tanks are not subject to this regulation.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from this 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 (PM_{10}), Particulate Matter less than 2.5 microns ($PM_{2.5}$), and Sulfur Dioxide (SO_2). 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. Antero included the following HAPs as emitted in substantive amounts in their emissions estimate: Benzene, n-Hexane, Toluene, and Xylene. 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	HAP	No	Inadequate Data
Benzene	TAP	Yes	Category A - Known Human Carcinogen
Toluene	HAP	No	Inadequate Data
Xylene	HAP	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*. 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 facility's permit application indicates that compliance with all state and federal air quality requirements will be achieved and this facility is expected to meet the requirements of General Permit G70-B. It is recommended that EQT should be granted a G70-B permit registration for SHR-60 Site.

David Keatley
Permit Writer - NSR Permitting

March 31, 2016
Date