



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: G70-A171
Plant ID No.: 085-00036
Applicant: Antero Resources Corporation (Antero)
Facility Name: Charlene Pad
Location: Pennsboro, Ritchie County
NAICS Code: 211111
Application Type: Modification
Received Date: July 30, 2015
Engineer Assigned: David Keatley
Fee Amount: \$1,500
Date Received: July 31, 2015
Complete Date: January 11, 2016
Due Date: February 25, 2016
Applicant Ad Date: July 30, 2015
Newspaper: *The Pennsboro News*
UTM's: Easting: 503,123 km Northing: 4,350.036 km Zone: 17
Description: Installation and operation of: one (1) 1.5-mmBtu/hr gas production unit (GPU) heater, eleven (11) 2.0-mmBtu/hr line heaters, and two (2) 12-mmBtu/hr enclosed combustors.

DESCRIPTION OF PROCESS

This facility produces natural gas and condensate. Raw natural gas (containing condensate, natural gas, and produced water) will first be heated by eleven (11) 2.0-mmBtu/hr line heaters. After the raw natural gas is heated by the line heaters it is heated by eleven (11) 1.5-mmBtu/hr GPU heaters. The natural gas from the GPUs will exit the facility via pipeline. The produced water will flow to two (2) 400-bbl produced water tanks at a maximum rate of 36,792,000 gallons/year. The condensate from the GPUs will go to low-pressure separators. The vapors from the low-pressure separators are compressed and exit the facility via pipeline.

The liquid from the low-pressure separators is sent to ten (10) 400-bbl condensate tanks at a maximum rate of 18,396,000 gallons/year.

The working, breathing, and flashing losses from each storage vessel will be captured and then controlled by two (2) 48" Cimarron enclosed combustors. Condensate and produced water will be loaded onto trucks and hauled offsite for sale or disposal.

Fugitive emissions will be associated with components and piping used to convey liquid and gases through the natural gas production process.

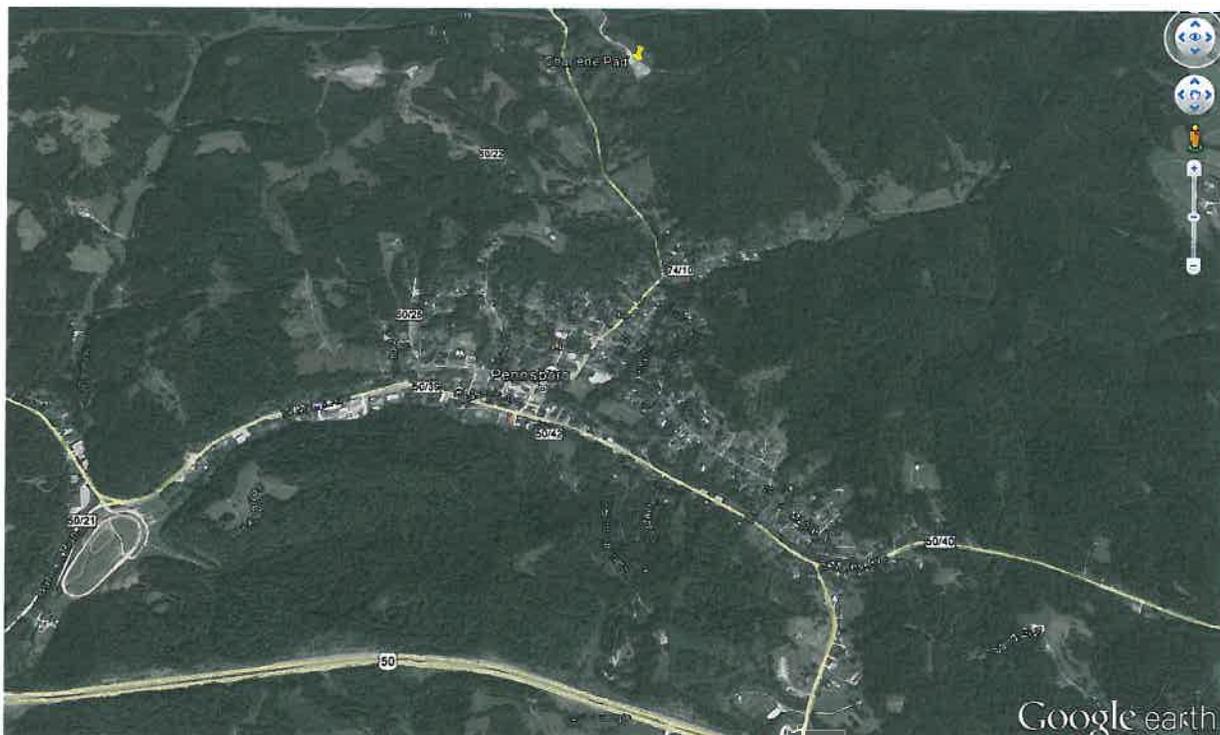
SITE INSPECTION

A site inspection was conducted on January 25, 2015 by James Robertson of the DAQ Enforcement Section. At that time the facility was deemed in compliance.

Latitude: 39.299797
Longitude: -80.963669

Directions as given in the permit application are as follows:

From Clarksburg travel west on US-50 for approximately 36 miles. Turn right on WV-74N/ Pullman Drive and travel north for approximately 0.6 miles. Turn left on E Myles Avenue/Old US 50 E for 0.6 miles. Turn right onto Grey Street and travel for approximately 0.2 miles. Turn sharply on E Penn Avenue and take the second right on 1st Street. Travel approximately 0.1 mile and turn right onto WV-74 N/ Mountain Drive. Travel 0.9 miles and the facility is on the right.



ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Fugitive emissions were estimated using USEPA Protocol for Equipment Leak Emission Estimates. Carbon Dioxide Equivalent (CO₂e) emissions were calculated using EPA's Subpart W Emission Reporting Tool. Truck loading yearly emissions will be estimated using a loading time of 50 minutes for a 200-bbl truck.

Table 1: New/Modified Calculation Methodologies

Emission Unit ID#	Process Equipment	Calculation Methodology
T001 - T010	Ten (10) 400-bbl Condensate Tanks	ProMax 3.2. using gas and liquid compositions from Lockhart Heirs Well Pad.
T011 - T012	Two (2) 400-bbl Produced Water Tanks	ProMax 3.2. using gas and liquid compositions from Lockhart Heirs Well Pad.
H011	One (1) 1.5-mmBtu/hr Heater Treater	EPA AP-42 Emission Factors
LH001 – LH011	Eleven (11) 2.0-mmBtu/hr Line Heaters	EPA AP-42 Emission Factors
L001	Condensate Truck Loading	EPA AP-42 Emission Factors
L002	Produced Water Truck Loading	EPA AP-42 Emission Factors
EC001 – EC002	12 MMBTU/hr Enclosed Combustors	EPA AP-42 Emission Factors

The following table indicates the equipment component count used in estimating the volatile organic compounds (VOC) and carbon dioxide equivalents (CO₂e) fugitive emissions.

Table 2: Component Counts

Component Type	Dedicated Gas Components	Dedicated Light Liquid Components
Connectors	649	0
Valves	550	572
Low Bleed Pneumatic Valves	0	0
Flanges	143	0

Table 3: Control Efficiencies

Emission Unit	Pollutant	Control Device	Control Efficiency
Ten (10) Condensate Tanks (T001 - T010)	Volatile Organic Compounds	EC001 or EC002 (Enclosed Combustors)	98 %
	Total HAPs		98 %
Two (2) Produced Water Tanks	Volatile Organic Compounds	EC001 or EC002	98 %
	Total HAPs		98 %

(T011 - T012)

(Enclosed Combustors)

Table 4: Maximum Estimated Controlled New/Modified Emissions

Emission Point ID	Emission Unit ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
EP-EC001 and EP-EC002	TANKCON D001-010 TANKPW 001-002 EC001 and EC002 for respective emission point	Cimarron 48" Enclosed Combustor (emissions per enclosed combustor)	Carbon Monoxide	0.37	1.63
			Nitrogen Oxides	0.44	1.94
			Volatile Organic Compounds	7.45	32.65
			Benzene	0.01	0.05
			Ethylbenzene	<0.01	0.01
			Toluene	0.01	0.04
			Xylenes	0.01	0.03
			n-Hexane	0.26	1.13
			Total Particulate Matter	0.03	0.15
			CO _{2e}	1,490	6,526
EP-H011	EU-H011	GPU Heater (emissions per unit)	Nitrogen Oxides	0.12	0.53
			Carbon Monoxide	0.10	0.44
			Volatile Organic Compounds	0.01	0.03
			PM	0.01	0.04
			PM ₁₀	0.01	0.04
			n-Hexane	<0.01	0.01
			CO _{2e}	145	633
EP-LH001 through EP-LH011	EU-LH001 through EU-LH011	Line Heaters (emissions per unit)	Nitrogen Oxides	0.16	0.70
			Carbon Monoxide	0.13	0.59
			Volatile Organic Compounds	0.01	0.04
			PM	0.01	0.05
			PM ₁₀	0.01	0.05
			n-Hexane	<0.01	0.01
			CO _{2e}	193	843

EP-L001 and EP-L002	EU-L001 and EU-L002	Truck Loading	Volatile Organic Compounds	10.14	9.25
			n-Hexane	0.02	0.02
			CO _{2e}	4	4
EP-FUG	EU-FUG	Fugitive Emissions	Volatile Organic Compounds	4.18	18.32
			Benzene	0.01	0.03
			Ethylbenzene	0.02	0.08
			n-Hexane	0.30	1.32
			Toluene	0.02	0.10
			Xylenes	0.05	0.24
			CO _{2e}	89	389

Table 5: Summarized Estimated Maximum Controlled Facility Wide PTE

Pollutant	Facility Wide PTE (tons/year)
Nitrogen Oxides	18.78
Carbon Monoxide	39.34
Volatile Organic Compounds	94.20
Particulate Matter-10/2.5	1.26
Sulfur Dioxide	0.09
n-Hexane	3.90
Benzene	0.14
Ethylbenzene	0.10
Toluene	0.19
Xylenes	0.30
Formaldehyde	0.04
Total HAPs	4.65
Carbon Dioxide Equivalent	29,830

REGULATORY APPLICABILITY

The following rules apply to the facility:

45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers)

The purpose of 45CSR2 is to establish emission limitations for smoke and particulate matter which are discharged from fuel burning units. 45CSR2 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 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions). 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 the proposed heater heaters (H011 and EU-LH001 through EU-LH011) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR2.

Antero would also be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

45CSR6 (To Prevent and Control Air Pollution from the Combustion of Refuse)

45CSR6 prohibits open burning, establishes emission limitations for particulate matter, and establishes opacity requirements. Sources subject to 45CSR6 include completion combustion devices, enclosed combustion devices, and flares.

The facility-wide requirements of the general permit include the open burning limitations §§45-6-3.1 and 3.2.

All completion combustion devices, enclosed combustion devices, and flares are subject to the particulate matter weight emission standard set forth in §45-6-4.1; the opacity requirements in §§45-6-4-3 and 4-4; the visible emission standard in §45-6-4.5; the odor standard in §45-6-4.6; and the testing standard in §§45-6-7.1 and 7.2.

Enclosed combustors that are used to comply with emission standards of NSPS, Subpart OOOO are subject to design, operational, performance, recordkeeping and reporting requirements of the NSPS regulation that meet or exceed the requirements of 45CSR6.

Antero has proposed two (2) 12-mmBtu/hr enclosed combustors for Charlene Pad. The enclosed combustor has estimated emissions of 0.03 lb/hr. The enclosed combustors have a maximum capacity of 496 lb/hr and an allowable emission rate of 1.35 lb/hr particulate matter. Therefore, the facility's enclosed combustor should demonstrate compliance with this rule. The facility will also monitor the flame of the flare and record any malfunctions that may cause no flame to be present during operation.

45CSR10 (To Prevent and Control Air Pollution from the Emissions of Sulfur Oxides)

The purpose of 45CSR10 is to establish emission limitations for sulfur dioxide which are discharged from fuel burning units. 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 the proposed heater treaters (H011 and EU-LH001 through EU-LH011) 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)

45CSR13 applies to this source due to the fact that Antero exceeds the regulatory emission threshold for criteria pollutants of 6 lb/hr and 10 ton/year for VOCs and requires to be permitted.

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)

45CSR16 applies to this source by reference of 40CFR60, Subpart OOOO. These requirements are discussed under that rule below.

45CSR22 (Air Quality Management Fee Program)

As can be seen in Table 5 this facility is a minor source. Antero is not subject to 45CSR30. The Charlene Well Pad is subject to 40CFR60 OOOO, however they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided they are not required to obtain a permit for a reason other than their status as an area source. This facility is not a natural gas compressor station and is a 9M source and is required to pay a \$200 annual fee. Antero 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 (SO₂) 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: Each gas well affected facility, which is a single natural gas well.

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

The gas wells that currently exist at the Charlene Pad were drilled principally for the production of natural gas 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 reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your reciprocating compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

There is a reciprocating internal combustion engine located at the Charlene Pad. The engine will be delivered after the effective date of this subpart. However, §60.5365(c) states that a reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart. Therefore, all requirements regarding reciprocating compressors under 40 CFR 60 Subpart OOOO would not apply.

- c. Pneumatic Controllers

- 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 which commenced construction after August 23, 2011, and is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not located at a natural gas processing plant.
- Each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller which commenced construction after August 23, 2011, and is located at a natural gas processing plant.

The pneumatic controllers at this facility were ordered and installed after August 23, 2011, however none of the pneumatic controllers are single continuous bleed natural gas driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh. Therefore, this section of this section of this regulation doesn't apply.

- d. 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 non-earthen 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.

The produced water tanks (TANKPW001-002) would emit less than 6tpy uncontrolled (4.69 tpy), however Antero has proposed controlling those tanks with an enclosed combustor. The condensate tanks (TANKCOND001-010) will be controlled by an enclosed combustor which will reduce the potential to emit to less than 6 tpy of VOC (3.25 tpy) per storage vessel. Therefore this facility is not subject to the section of the regulation.

The following rules 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 Antero have proposed is not used to comply with one of these regulations. The purpose of the enclosed combustors are to control emissions from the tanks that are

routed to it. However, these tanks are not subject to 40CFR60 Subpart Kb due to their size. In addition 40CFR60.18 refers to flares but makes no mention of enclosed combustion devices. Therefore, Antero 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. The tanks that Antero has proposed to install are 63.60 cubic meters each. Therefore, Antero is not be subject to this regulation.

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. HAPs are those pollutants that are specifically identified in section 112(b) of the Clean Air Act. To be listed as a HAP, EPA must find that the chemical in question may present a threat to human health and cause adverse environmental effects. If the facility has the potential to emit 10 tons per year of any pollutant on the HAP list, or any combination of pollutants on that list for a total of 25 tons per year, the facility is considered a major source of HAPs. Otherwise, it is considered an area source.

The following table lists each HAP’s carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

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
Xylene	VOC	No	Inadequate Data
Ethylbenzene	VOC	No	Category D - Not classifiable as to human carcinogenicity

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.

RECOMMENDATION TO DIRECTOR

The information provided in the 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 Antero Resources Corporation's request to modify and operate Charlene Wellpad natural gas production facility is recommended to the Director of Air Quality.



David Keatley
Permit Writer – NSR Permitting

January 14, 2016

Date