



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-A117B
Plant ID No.: 085-00042
Applicant: Antero Resources Corporation (Antero)
Facility Name: Noland Wellpad
Location: near Pennsboro, Ritchie County
NAICS Code: 211111
Application Type: Modification
Received Date: July 30, 2015
Engineer Assigned: David Keatley
Fee Amount: \$1,500
Date Fees Received: July 31, 2015
Complete Date: January 6, 2015
Due Date: February 20, 2015
Applicant Ad Date: July 30, 2015
Newspaper: *The Pennsboro News*
UTM's: Easting: 501.879 km Northing: 4,349.971 km Zone: 17
Description: Installation and operation of: ten (10) 2.0-mmBtu/hr line heaters, two (2) additional 1.5-mmBtu/hr GPU heaters, four (4) additional 400-bbl condensate tanks, two (2) 400-bbl produced water tanks, and one (1) additional 12-mmBtu/hr enclosed combustor.

DESCRIPTION OF PROCESS

Operation of natural gas and condensate production facility. Raw natural gas (natural gas, condensate, and produced water) from ten (10) natural gas wells go to ten (10) 2.0-mmBtu/hr line heaters where the raw natural gas is heated. The preheated raw natural gas flows to ten (10) 1.5-MMBTU/hr gas producing units (GPU) heaters (H001 through H010) to be heated more. Natural gas from the GPUs is sent to a compressor to raise the pressure of the natural gas stream. The compressor is powered by a 24-bhp natural gas fired Kubota DG972-E2 compressor engine ENG001. After compression the natural gas stream exits the facility via the sales gas pipeline. Condensate from the GPU is sent to

ten (10) 400-bbl condensate tanks at a maximum rate of 30,660,000 gallons/year. Produced water from the GPUs is sent to two (2) produced water tanks at a maximum rate of 61,320,000 gallons/year. Working, breathing, and flash losses from the condensate tanks and produced water tanks will be controlled with a minimum of 98% control efficiency by two (2) 12-mmBtu/hr Cimarron 48" enclosed combustors (EC001 and EC002). Condensate and produced water will be trucked off site.

SITE INSPECTION

James Robertson of DEP DAQ Compliance and Enforcement Section performed a site visit on January 28, 2015 and deemed the site suitable for the G70-A with the closest residence is approximately 400-500 ft. from the proposed site.

From US 50 take SR 74 north. Stay straight on CR 50/39 (West Myles Avenue) until you get to Eagle Drive. Turn right onto Eagle drive travel until you reach CR 50/25 (Collins Avenue). Turn right onto CR 50/25. Turn left onto CR 50/22 (Rose Hill). Travel for approximately 1.1 miles. Access road to the facility is on the left.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

A representative gas sample and a representative liquid sample was taken from Lockhart Heirs Pad and both were used in ProMax 3.2 to estimate the emissions from the condensate tanks and produced water tanks. The enclosed combustors are considered to have a 98% efficiency. Emissions were estimated using the maximum throughput at each enclosed combustor. Emissions from H001 through H010 and LH001 through LH010 were estimated with AP-42 emission factors. Fugitive emissions were estimated using the EPA's *Protocol for Equipment Leak Emission Estimates*. Condensate and produced water loading emissions were estimated with Promax outputs entered in AP-42 equation from Section 5.2-4 for submerged loading for dedicated normal service using a maximum truck loading rate of 200 bbl in 50 minutes.

Table 1: Maximum Estimated Controlled Air Emissions

Emission Point ID	Emission Unit ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
EP-EC001 and EP-EC002	TANKCOND 001-010 TANKPW 001-002 EC001 and EC002 for respective emission point	Cimarron 48" Enclosed Combustor (emissions per enclosed combustor)	Carbon Monoxide	0.31	1.37
			Nitrogen Oxides	0.37	1.63
			Volatile Organic Compounds	6.25	27.39
			Benzene	0.01	0.04
			Ethylbenzene	<0.01	0.01
			Toluene	0.01	0.04
			Xylenes	0.01	0.02
			n-Hexane	0.21	0.94
			Total Particulate Matter	0.03	0.13
			CO ₂ e	1,377	6,028
EP-H009 and EP-H010	EU-H009 and EU-H010	GPU Heaters (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 ₂ e	145	633
EP-LH001 through EP-LH010	EU-LH001 through EU-LH010	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 ₂ e	193	843

EP-L001 and EP-L002	EU-L001 and EU-L002	Truck Loading	Volatile Organic Compounds	10.14	7.71
			n-Hexane	0.02	0.02
			CO ₂ e	4	4
EP-FUG	EU-FUG	Fugitive Emissions	Volatile Organic Compounds	3.80	16.66
			Benzene	0.01	0.03
			Ethylbenzene	0.02	0.07
			n-Hexane	0.27	1.20
			Toluene	0.02	0.09
			Xylenes	0.05	0.22
			CO ₂ e	81	354

Table 2: Summarized Estimated Maximum Controlled Facility Wide PTE

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	16.93
Carbon Monoxide	37.78
Volatile Organic Compounds	80.36
Total Particulate Matter	1.66
PM ₁₀	1.66
Sulfur Dioxide	0.08
Benzene	0.12
Ethylbenzene	0.09
Toluene	0.16
Xylenes	0.27
n-Hexane	3.38
Total HAP Emissions	4.03
CO ₂ e	27,319

REGULATORY APPLICABILITY

The following rules and regulations apply to the facility:

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

The purpose of 45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) 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 all of the proposed fuel burning units (EU-H009 through EU-H010 and EU-LH001 through EU-LH010) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR2. However this facility will be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

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

The purpose of this rule is to prevent and control air pollution from combustion of refuse.

Antero has two (2) enclosed combustors at this facility. The enclosed combustors are subject to section 4, emission standards for incinerators. The enclosed combustors have a maximum capacity of 816 lb/hr and an allowable emission rate of 2.22 pounds of particulate matter per hour. The enclosed combustors have hourly particulate matter emissions rate which is 0.03 lb/hr as can be seen in Table 1. Therefore, the facility's enclosed combustors should demonstrate compliance with this rule.

Fact Sheet G70-A117B
Antero Resources Corporation
Noland Wellpad

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 (EU-H009 through EU-H010 and EU-LH001 through EU-LH010) 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)

As can be seen from Table 2, VOCs are above the 6 lb/hr and 10 tons/year threshold and 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 they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71. This facility has a maximum horsepower capacity less than 1,000 hp (24-hp) 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:

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

The ten (10) 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

Fact Sheet G70-A117B
Antero Resources Corporation
Noland Wellpad

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.

Condensate storage vessels (TANKCOND) located at this facility would emit more than 6 tpy of VOC per tank uncontrolled (136.2 tpy each). The produced water tanks (TANKPW) at 3.9 tpy would not be subject to this regulation uncontrolled. Antero has proposed installing enclosed combustors to control 98% of the VOC emissions from the storage tanks, which makes this facility not subject to this section of this regulation.

Fact Sheet G70-A117B
Antero Resources Corporation
Noland Wellpad

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 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. 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/HAP	No	Inadequate Data
Benzene	VOC/HAP	Yes	Category A - Known Human Carcinogen
Ethylbenzene	VOC/HAP	No	Category D - Not classifiable as to human carcinogenicity
Toluene	VOC/HAP	No	Inadequate Data
Xylenes	VOC/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

Fact Sheet G70-A117B
Antero Resources Corporation
Noland Wellpad

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 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 Noland Wellpad natural gas production facility is recommended to the Director of Air Quality.



David Keatley
Permit Writer - NSR Permitting

January 7, 2016

Date

Fact Sheet G70-A117B
Antero Resources Corporation
Noland Wellpad