west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	G70-A068A
Plant ID No.:	017-00112
Applicant:	Antero Resources Corporation (Antero)
Facility Name:	Cofor Wellpad
Location:	near West Union, Doddridge County, West Virginia
NAICS Code:	211111
Application Type:	Modification
Application Received:	October 13, 2015
Engineer Assigned:	David Keatley
Fee Amount:	$1,500
Date Fee Received:	October 14, 2015
Complete Date:	February 5, 2016
Due Date:	March 21, 2016
Applicant Ad Date:	October 12, 2015
Newspaper:	*The Doddridge Independent*
UTM's:	Easting: 517.24 km Northing: 4,350.02 km Zone: 17
Description:	Permit registration G70-A068A will supersede and replace G70-A068. With this application the applicant increases the condensate throughput and proposes the installation and operation of: ten (10) 2.0-MMBTU/hr line heaters and one (1) 12-MMBTU/hr Cimarron 48" enclosed combustor.

DESCRIPTION OF PROCESS

This facility produces natural gas and condensate. Raw natural gas (natural gas, condensate, and produced water) from ten (10) natural gas wells are heated by ten (10) 2.0-mmBtu/hr line heaters (LH001 through LH010) to encourage phase separation. After being heated by the line heaters the raw natural gas is heated by ten (10) 1.5-MMBTU/hr gas producing units (GPU) heaters (H001 through H010) to further encourage phase separation. Natural gas from the GPUs exit the facility via pipeline. Condensate from the

GPUs is sent to low-pressure separators. Liquid from the low-pressure separators is sent to ten (10) 400-bbl condensate tanks at a maximum rate of 8,431,500 gallons/year. The vapors from the low-pressure separators are compressed to a higher pressure and exit the facility via pipeline. The compressor is powered by a four-stroke rich-burn 24-bhp natural gas fired Kubota DG972-E2 compressor engine ENG001. Produced water from the GPUs is sent to two (2) produced water tanks at a maximum rate of 16,863,000 gallons/year. Working, breathing, and flash losses from the condensate tanks and produced water tanks will be controlled by two (2) 12-MMBtu/hr Cimarron 48" enclosed combustor. Condensate and produced water will be trucked off site.

SITE INSPECTION

Douglas Hammell of DEP DAQ Compliance and Enforcement Section performed a site visit on August 26, 2015 the facility was deemed in compliance.

From US 50 turn onto CR 50/30. Travel approximately 1.7 miles and turn left onto CR 11-8 (Tunnel Hill Road). Travel approximately 1.0 miles and the access road for the facility is on the right.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

A representative gas and liquid sample from the Jonathan Davis Well Pad was 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 from LH001 through LH010 were estimated with AP-42. Fugitive emissions were estimated using the EPA's *Protocol for Equipment Leak Emission Estimates*. Condensate and produced water loading emissions were estimated with equation in AP-42 Section 5.2-4 using submerged loading dedicated service.

Table 1: Maximum Controlled Estimated Modified/New PTE

Emission Point ID	Emission Unit ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
EP-EC001 and EP-EC002	EC001 and EC002 (Controlling TANKCOND001-010 and TANKPW001-002)	Cimarron Combustors (Controlling Condensate and Produced Water Tanks) Emissions per Each	Carbon Monoxide	0.30	1.31
			Nitrogen Oxides	0.36	1.57
			Volatile Organic Compounds	6.73	29.47
			Total Particulate Matter	0.03	0.12
			Benzene	<0.01	0.01
			Ethylbenzene	<0.01	0.01
			n-Hexane	0.23	1.00
			Toluene	0.01	0.03
			Xylenes	0.01	0.03
			CO_2e	1,281	5,611
EP-LH001 through EP-LH010	LH001 through LH010	Line Heaters (Emissions per each)	Nitrogen Oxides	0.16	0.72
			Carbon Monoxide	0.14	0.60
			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	197	861
EP-L001	EU-L001	Condensate Truck Loading	Volatile Organic Compounds	15.65	6.55
			n-Hexane	0.04	0.02
			CO_2e	2	1
EP-L002	L002	Produced Water Truck Loading	Volatile Organic Compounds	<0.01	<0.01
			CO_2e	1	1

EP-FUG	EU-FUG	Fugitive Emissions	Volatile Organic Compounds	3.61	15.79
			Benzene	<0.01	0.01
			Ethylbenzene	0.03	0.11
			n-Hexane	0.23	1.03
			Toluene	0.02	0.10
			Xylenes	0.07	0.30
			CO_2e	84	368

Table 2: Summarized Estimated Total Facility PTE

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	17.06
Carbon Monoxide	37.90
Volatile Organic Compounds	82.43
Total Particulate Matter	1.61
PM_{10}	1.61
Sulfur Dioxide	0.08
Formaldehyde	0.03
Benzene	0.05
Ethylbenzene	0.15
Toluene	0.17
Xylenes	0.36
n-Hexane	3.30
Total HAP Emissions	4.04
CO_2e	26,798

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 (LH001 through LH010) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR2. However this facility would 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 will have two (2) enclosed combustors at this facility. The enclosed combustor is subject to section 4, emission standards for incinerators. The enclosed combustor has a maximum capacity of 420 lb/hr and an allowable emission rate of 1.14 pounds of particulate matter per hour. Each enclosed combustor has an hourly particulate matter emissions rate which is 0.03 lb/hr of total particulate matter. Therefore, the facility's enclsoed combustors should demonstrate compliance with this section. The facility will also monitor the flame of the vapor combustor 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)

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 (LH001 through 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, two pollutants are above the 6lb/hr and 10 tons/year thresholds and this facility requires a permit. In addition this permitting action is a modification because this action triggered 40CSR6 which has substantive requirements.

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 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 (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:

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.

All storage vessels (TANKCOND and TANKPW) located at this facility would emit more than 6 tpy of VOC per tank uncontrolled (146.83 tpy each and 2.72 tpy respectively). Antero has proposed installing enclosed combustor to control 98% of the VOC emissions from the storage tanks, which makes this facility 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 combustor that Antero 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. 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 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, Xylene, and Ethylbenzene. 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
Ethylbenzene	HAP	No	Category D - Not classifiable as to human carcinogenicity

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-A. It is recommended that Antero should be granted a G70-A permit for Cofor Wellpad.

David Keatley

David Keatley
Permit Writer - NSR Permitting

February 10, 2016

Date