west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	G70-A036B
Plant ID No.:	017-00101
Applicant:	Antero Resources Corporation (Antero)
Facility Name:	Cline Well Pad
Location:	Doddridge County
NAICS Code:	211111
Application Type:	Modification
Received Date:	February 5, 2015
Engineer Assigned:	David Keatley
Fee Amount:	$1500.00
Date Fee Received:	February 9, 2015
Complete Date:	April 10, 2015
Due Date:	May 25, 2015
Applicant Ad Date:	February 10, 2015
Newspaper:	*The Herald Record*
UTM's:	Easting: 525.944 km Northing: 4,337.441 km Zone: 17S
Description:	Installation and operation of one (1) 1.5 mmBtu/hr GPU heater and one (1) 24-bhp flash gas compressor engine. Increase in produced liquids throughput. Truck loading will be uncontrolled. Removal of one (1) 1.0-mmBtu/hr GPU heater.

DESCRIPTION OF PROCESS

Raw natural gas from the six (6) wells enters the facility through a number of low pressure separators where the gas phase is separated from the liquid phase. Gas production unit (GPU) heaters (H001-H006) are used in conjunction with the separators to help separate the gas from the liquid phases. These heaters are fueled by a slip stream of the separated gas. The compressed gas is then metered and sent to the sales gas pipeline. The separated produced liquids from the separators flow to storage tanks (TANK001-008).

Flashing, working, and breathing losses from the tanks are sent to the flare (FL001) to control emissions. The facility will utilize a Cimmaron Model No. 48" HV ECD flare designed to operate at 8,760 hours per year. The flare will incorporate an automatic re-ignition system in the event the flare is extinguished. A thermocouple will be used to monitor the presence of a pilot flame.

Condensate and produced water are transported off-site on an as-needed basis via tanker truck. The maximum annual throughput will be 11,947,400 gallons per year. Truck loading connections are in place to pump condensate and produced water (L001) from the storage tanks into tanker trucks. Emissions from the loading operations are vented back to the storage tank via a vapor return line and a capture efficiency of 70% is use to estimate emissions.

Emissions from the facility's emission sources were calculated using the extended analysis gas analysis and liquid sample from Tom's Fork Unit 1H, one of the wells in the Erwin Hilltop Pad. These extended analysis are considered representative of the materials from Cline, being in the same Marcellus rock formation. The flashing, working & breathing losses from the tanks are sent to the flare. The flare that will be used to control emissions is designed to achieve a VOC destruction efficiency of 98%.

SITE INSPECTION

A site inspection was conducted on April 22, 2014 by Douglas Hammel of the Enforcement Section. "The site is suitable for general permit G70-A036. There are no residences within 300 ft. While I was there, rig was still on site, there were no permanent tanks, just Baker tanks."

From New Milton, at the intersection of C/R 25/2 and C/R 25, head north on C/R 25 / Meathouse Fork Road for 1.2 miles. Turn left to WV-18S and go for 5.1 miles. Turn right to unnamed road for 0.1 miles. Facility entrance will be on the left.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

GPU heaters were estimated using AP-42 emission factors. Emissions from the combustor were estimated using vapors from the tanks in ProMax 3.2 and using a 98% control efficiency. Condensate and produced water loading emissions were estimated with AP-42. Emissions for engine ENG001 were estimated with manufacture date and AP-42 emission factors. Fugitive emissions were estimated using the EPA's *Protocol for Equipment Leak Emission Estimates*.

Table 1: Maximum Controlled Estimated Air Emissions

Emission Unit	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
H001-H006 GPU Heaters (Combined)	Nitrogen Oxides	0.54	2.36
	Carbon Monoxide	0.46	1.98
	Volatile Organic Compounds	0.03	0.13
	Sulfur Dioxide	<0.01	0.02
	Particulate Matter-10	0.04	0.18
	CO_2e	649	2,843
TANK001-008 Produced Liquid Tanks (Controlled by a Combustor)	Volatile Organic Compounds	0.34	1.47
	Carbon Monoxide	0.04	0.18
	Nitrogen Oxides	0.05	0.21
	Hexane	0.02	0.06
L001 Produced Liquids Loading	Volatile Organic Compounds	5.40	3.20
	Hexane	0.02	<0.01
ENG001 Compressor Engine Kubota DG972-E2	Nitrogen Oxides	0.32	1.39
	Carbon Monoxide	5.65	24.73
	PM	<0.01	0.01
	Volatile Organic Compounds	<0.01	0.03
	CO_2e	28	120
Fugitives F001	Volatile Organic Compounds	2.18	9.55
	Toluene	0.02	0.06
	Xylenes	0.06	0.25
	Ethylbenzene	0.03	0.10
	Hexane	0.14	0.62
	CO_2e	52	227

Table 2: Summarized Estimated Maximum Controlled Facility Wide PTE

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	3.95
Carbon Monoxide	26.88
Volatile Organic Compounds	14.56
Total Particulate Matter	0.31
PM_{10}	0.31
Sulfur Dioxide	0.02
Benzene	0.01
Ethylbenzene	0.03
Toluene	0.06
Xylenes	0.26
n-Hexane	0.55
Total HAP Emissions	0.99
CO_2e	3,780

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

The GPU heater (H006) has been determined to meet the definition of a "fuel burning unit" under 45CSR2 and are, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of the unit is less than 10 mmBtu/hr, it is not subject to sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement is under Section 3.1 - Visible Emissions Standards.

Pursuant to 45CSR2, Section 3.1, the line heaters are subject to an opacity limit of 10%. Proper maintenance and operation of the unit (and the use of natural gas as fuel) should keep the opacity of the unit well below 10% during normal operations.

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 one (1) flare at the facility. The flare is subject to section 4, emission standards for incinerators. The flare has an allowable emission rate of 5.02 pounds of particulate matter per hour (assuming a natural gas density of 0.044 lb/ft^3).

The flare has negligible amounts of particulate matter emissions per hour. Therefore, the facility's flare should demonstrate compliance with this section. The facility will demonstrate compliance by maintaining records of the amount of natural gas consumed by the flare and the hours of operation. 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

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 unit (H006) is 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

With this application Antero proposes to modify their flare and with therefore applied for a modification 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 which is required to pay a $200 annual fee. Antero is required to keep their Certificate to Operate current.

40CFR60 Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE)

40CFR60 Subpart JJJJ sets forth emission limits, fuel requirements, installation requirements, and monitoring requirements based on the date of construction, date of manufacture, and horsepower (hp) of the spark ignition internal combustion engine. All proposed engines will commence construction after June 12, 2006.

ENG001 is subject to this subpart due to the manufacturers date of the engine.

ENG001 is a certified engine and the Certificate on Conformity will be available in the file. To keep the designation of certified this engine must be operated and maintained to the manufacturer's emission-related written instructions and must keep records of conducted maintenance to demonstrate compliance.

40 CFR 60, 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 twelve (12) 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.

All storage vessels located at this facility would emit more than 6 tpy of VOC per tank uncontrolled (9.13 tpy each). Antero has proposed installing a vapor combustor to control 98% of the VOC emissions from the storage tanks, which makes this facility not subject to this section of this regulation.

40CFR63 Subpart ZZZZ National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

The facility is a minor source of hazardous air pollutants (HAPS < 10 tpy of an individual HAP and < 25 tpy of aggregate HAPs) as can be seen in Table 2. The facility is therefore considered an area source (§63.6585(c)). The engine is considered new stationary RICE (§63.6590(a)(2)(iii)) due to the installation date of the engine (ENG001) being after June 12, 2006.

Stationary RICE subject to Regulations under 40 CFR Part 60 must meet the requirements of those subparts that apply (40 CFR 60 Subpart JJJJ, for spark ignition engines) if the engine is a new stationary RICE located at an area source (§63.6590(c)(1)). No additional requirements apply for this engine under this subpart.

Non Applicability Determinations

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 vapor combustor that Antero has proposed is not used to comply with one of these regulations. The purpose of the vapor 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.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There will be small amounts of various regulated hazardous air pollutants emitted from the operation of this facility as seen in Table 1. The facility is a minor source of HAPs as can be seen in Table 2. Additional information about individual hazardous air pollutants is available at EPAs website [http://www.epa.gov/ttn/atw/hlthef/hapindex.html].

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's request to modify and operate its cline Wellpad natural gas production facility is recommended to the Director of Air Quality.

David Keatley

David Keatley
Engineer - NSR Permitting

April 10, 2015

Date