



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3077
Plant ID No.: 095-00029
Applicant: Antero Resources Appalachian Corporation (Antero)
Facility Name: Forest Pad
Location: Alma, Tyler County
NAICS Code: 211111
Application Type: Construction
Received Date: May 10, 2013
Engineer Assigned: Jerry Williams, P.E.
Fee Amount: \$2,000.00
Date Received: May 10, 2013
Complete Date: June 19, 2013
Due Date: September 17, 2013
Applicant Ad Date: May 15, 2013
Newspaper: *Tyler Star News*
UTM's: Easting: 522.393 km Northing: 4,360.758 km Zone: 17
Description: This permitting action proposes the installation of a natural gas production facility consisting of two (2) heaters, two (2) condensate tanks, two (2) produced water tanks, condensate and produced water truck loading, and one (1) flare.

DESCRIPTION OF PROCESS

The following process description was taken from Permit Application R13-3077:

The facility is primarily responsible for natural gas production, but also generates condensate and produced water. The condensate, gas and water from the two (2) wells flows from the well heads to dedicated gas production units (GPU). Each GPU has one (1) heater treater that is used to facilitate the separation of the liquids from the gas. In the GPUs, the liquids and gases are separated in a 3 phase separator. After the initial separation the condensate is processed in a Low Pressure Flash Separator, where gas entrained in the condensate is separated and sent to the flare.

The product gas from the separator continues on to metering and eventually the pipeline. A small quantity of product gas is routed to the flare for pilot gas. From the GPU the remaining condensate and produced water is sent to storage vessels. Each storage vessels' working, breathing and flashing losses are captured and then controlled by a flare. After storage, the condensate and produced water are loaded onto trucks and hauled offsite for sale or disposal.

SITE INSPECTION

A site inspection was conducted by Jamie Jarrett of the DAQ Enforcement Section on March 7, 2013. Terry Wyckoff of Antero escorted Mr. Jarrett to the site. Mr. Wyckoff stated Hy-Bon Engineering conducted tank VOC/HAP measurements at the Forest Pad. Mr. Jarrett also spoke with Donald Gray of Antero about permitting requirements for permanent flares/vapor combustors. Mr. Jarrett told him 45CSR6 allows the operation of a flare for 10 to 30 days depending on its use without a permit. Mr. Jarrett found that the Forest Pad is in violation for not obtaining a 45CSR13 permit prior to installation and operation of the enclosed vapor combustor.

Latitude: 39.396028
Longitude: -80.739939

Directions as given in the permit application are as follows:

From Clarksburg: Head southwest on US-50W for 14.8 miles. Turn right onto County Route 3/Big Flint Road for 11.7 miles. Turn left onto West Virginia 23 W. The Forest Pad site is 0.6 miles on the left.



ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this modification application consist of two (2) heaters (H001, H002), one (1) flare (FL001) which vents the emissions of two (2) condensate tanks (T001, T002) and two (2) produced water tanks (T003, T004), condensate truck loading (L001), produced water truck loading (L002), and fugitive emissions (F001).

The following table indicates which methodology was used in the emissions determination:

Emission Unit ID#	Process Equipment	Calculation Methodology
H001, H002	0.5 MMBTU/hr Gas Production Unit Burners	EPA AP-42 Emission Factors
T001, T002	400 bbl Condensate Tanks	E&P Tanks Emission Estimation Software
T003, T004	400 bbl Produced Water Tanks	EPA Tanks 4.09 Emission Estimation Software
L001	Condensate Truck Loading	EPA AP-42 Emission Factors
L002	Produced Water Truck Loading	EPA AP-42 Emission Factors
FL001	6.63 MMBTU/hr Flare	EPA AP-42 Emission Factors, Mass Balance

Fugitive emissions for the facility are based on calculation methodologies presented in EPA Protocol for Equipment Leak Emission Estimates. Fugitive emissions include leaks from connectors, valves, low bleed pneumatic valves, and flanges.

The following table indicates the control device efficiencies that are required for this facility:

Emission Unit	Pollutant	Control Device	Control Efficiency
T001 – T004 Storage Tanks	Volatile Organic Compounds	Flare	98.00 %
	Total HAPs		98.00 %

The total facility PTE for the Forest Pad is shown in the following table:

Pollutant	Facility Wide PTE (tons/year)
Nitrogen Oxides	2.41
Carbon Monoxide	11.10
Volatile Organic Compounds	10.22
Particulate Matter	0.44
Particulate Matter-10	0.44
Particulate Matter-2.5	0.44
Sulfur Dioxide	<0.01
Total HAPs	0.38
Carbon Dioxide Equivalent	5,552

Maximum detailed controlled point source emissions were calculated by Antero and checked for accuracy by the writer and are summarized in the table on the next page.

Antero Resources Appalachian Corporation – Forest Pad (R13-3077)

Emission Point ID#	Source	NO _x		CO		VOC		PM-10		PM-2.5		SO ₂		Total HAPs		CO ₂ e		
		lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	
H001	Heater 001	0.05	0.22	0.04	0.18	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	60	260
H002	Heater 002	0.05	0.22	0.04	0.18	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	60	260
F001	Flare	0.45	1.97	2.45	10.74	0.47	2.04	0.09	0.40	0.09	0.40	<0.01	<0.01	0.01	0.05	1140	4991	
L001	Condensate Truck Loading	0	0	0	0	0.29	1.26	0	0	0	0	0	0	<0.01	0.02	0	0	
L002	Prod. Water Truck Loading	0	0	0	0	0.11	0.48	0	0	0	0	0	0	<0.01	<0.01	0	0	
F001	Fugitive Emissions	0	0	0	0	1.46	6.40	0	0	0	0	0	0	0.07	0.32	10	41	
Total	Total Facility PTE	0.55	2.41	2.53	11.10	2.33	10.22	0.09	0.44	0.09	0.44	<0.01	<0.01	0.08	0.38	1270	5552	

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 (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 (H001, H002) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR2. However, Antero would 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)

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

Antero has one (1) flare at the Forest Pad. The flare is subject to section 4, emission standards for incinerators. The flare has an allowable emission rate of 237.6 pounds of particulate matter per hour (assuming a natural gas density of 0.044 lb/ft³). The flare has an hourly particulate matter emissions rate of 0.09 lb/hr. 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 units (H001, H002) 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 is defined as a “stationary source” under 45CSR13 Section 2.24.b, which states that an owner or operator discharges or has the potential to discharge more than six (6) pounds per hour and ten (10) tons per year, or has the potential to discharge more than 144 pounds per calendar day of any regulated air pollutant. Antero’s uncontrolled volatile organic compounds (VOC) emissions exceed 45CSR13 permit thresholds. Antero has published the required Class I legal advertisement notifying the public of their permit application, and paid the appropriate application fee (construction).

45CSR22 (Air Quality Management Fee Program)

This facility is a minor source and not subject to 45CSR30. 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 gas wells that currently exist at the Forest 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 to demonstrate continuous compliance by submitting reports and maintaining records for each completion operation.

- b. Each centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals that is 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 centrifugal compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A centrifugal 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 are no centrifugal compressors at the Forest Pad. Therefore, all requirements regarding centrifugal compressors under 40 CFR 60 Subpart OOOO would not apply.

- c. 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 are no reciprocating compressors at the Forest Pad. Therefore, all requirements regarding centrifugal compressors under 40 CFR 60 Subpart OOOO would not apply.

- d. 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.

There are no continuous bleed gas-driven pneumatic controllers at the Forest Pad. Therefore, there are no applicable requirements regarding pneumatic controllers under 40 CFR 60 Subpart OOOO that would apply.

- e. 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.

The storage vessels located at the Forest Pad are controlled by a flare and as a result emit less than 6 tpy of VOC. Therefore, Antero is not required by this section to further reduce VOC emissions by 95%.

- f. The group of all equipment, except compressors, within a process unit is an affected facility.
- Addition or replacement of equipment for the purpose of process improvement that is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart.
 - Equipment associated with a compressor station, dehydration unit, sweetening unit, underground storage vessel, field gas gathering system, or liquefied natural gas unit is covered by §§60.5400, 60.5401, 60.5402, 60.5421 and 60.5422 of this subpart if it is located at an onshore natural gas processing plant. Equipment not located at the onshore natural gas processing plant site is exempt from the provisions of §§60.5400, 60.5401, 60.5402, 60.5421 and 60.5422 of this subpart.
 - The equipment within a process unit of an affected facility located at onshore natural gas processing plants and described in paragraph (f) of this section are exempt from this subpart if they are subject to and controlled according to subparts VVa, GGG or GGGa of this part.

The Forest Pad is not a natural gas processing plant. Therefore, Leak Detection and Repair (LDAR) requirements for onshore natural gas processing plants would not apply.

- g. Sweetening units located at onshore natural gas processing plants that process natural gas produced from either onshore or offshore wells.
- Each sweetening unit that processes natural gas is an affected facility; and
 - Each sweetening unit that processes natural gas followed by a sulfur recovery unit is an affected facility.
 - Facilities that have a design capacity less than 2 long tons per day (LT/D) of hydrogen sulfide (H₂S) in the acid gas (expressed as sulfur) are required to comply with recordkeeping and reporting requirements specified in §60.5423(c) but are not required to comply with §§60.5405 through 60.5407 and paragraphs 60.5410(g) and 60.5415(g) of this subpart.
 - Sweetening facilities producing acid gas that is completely reinjected into oil-or-gas-bearing geologic strata or that is otherwise not released to the atmosphere are not subject to §§60.5405 through 60.5407, 60.5410(g), 60.5415(g), and 60.5423 of this subpart.

There are no sweetening units at the Forest Pad. Therefore, all requirements regarding sweetening units under 40 CFR 60 Subpart OOOO would not apply.

40CFR60 Subpart 60.18 (General Control Device and Work Practice Requirements)

40CFR60 Subpart 60.18 contains requirements for control devices when they are used to comply with applicable subparts of 40CFR60 and 40CFR61. The flare that Antero has proposed to control emissions from the tanks and truck loading is subject to this rule. Antero will be required to do the following:

- The flare shall be designed and operated with no visible emissions per Method 22 except for periods not to exceed a total of five (5) minutes during any two (2) consecutive hours.
- The flare shall be operated with a flame present at all times.
- Method 22 shall be used to determine the compliance of the flare with the required visible emissions provisions.
- The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device.

The following rules do not apply to the facility:

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 would not be subject to this rule.

40CFR60 Subpart KKK (Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants)

40CFR60 Subpart KKK applies to onshore natural gas processing plants that commenced construction after January 20, 1984, and on or Before August 23, 2011. The Forest Pad was constructed after August 23, 2011 and is not a natural gas processing plant, therefore, Antero would not be subject to this rule.

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

There are no SI ICEs at the Forest Pad. Therefore, Antero would not be subject to this rule.

45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants)

45CSR19 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment)

The Forest Pad is located in Tyler County which is an attainment county for all pollutants.

As shown in the table below, Antero is not subject to 45CSR14 or 45CSR19 review.

Pollutant	PSD (45CSR14) Threshold (tpy)	NANSR (45CSR19) Threshold (tpy)	Forest Pad PTE (tpy)	45CSR14 or 45CSR19 Review Required?
Carbon Monoxide	250	NA	11.10	No
Nitrogen Oxides	250	NA	2.41	No
Sulfur Dioxide	250	NA	0.01	No
Particulate Matter 2.5	250	NA	0.44	No
Ozone (VOC)	250	NA	10.22	No
Greenhouse Gas (CO ₂ e)	100,000	NA	5,552	No

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There will be small amounts of various non-criteria regulated pollutants emitted from the combustion of natural gas. However, due to the concentrations emitted, detailed toxicological information is not included in this evaluation.

AIR QUALITY IMPACT ANALYSIS

Modeling was not required of this source due to the fact that the facility is not subject to 45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants) as seen in the table listed in the Regulatory Discussion Section.

SOURCE AGGREGATION

“Building, structure, facility, or installation” is defined as all the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous and adjacent properties, and are under the control of the same person.

The Forest Pad is located in Tyler County and will be operated by Antero, who is the owner and operator. Several different entities are involved in the production, gathering, and transmission of gas. The Operators are the parties who drill and operate the wells. The Shippers are the owners of the gas who may or may not be the same entity as the Operator. There are also parties who own and operate the gathering system pipelines and compression station, called Gatherers. In addition, there are parties that own and operate the gas processing plants.

1. The Forest Pad will operate under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding wells and compressor stations operated by Antero that share the same two-digit major SIC code of 13 for oil and gas exploration and production. Therefore, the Forest Pad does share the same SIC code as other related sources.
2. “Contiguous or Adjacent” determinations are made on a case by case basis. These determinations are proximity based, and it is important to focus on this and whether or not it meets the common sense notion of a plant. The terms “contiguous” or “adjacent” are not defined by USEPA. Contiguous has a dictionary definition of being in actual contact; touching along a boundary or at a point. Adjacent has a dictionary definition of not distant; nearby; having a common endpoint or border.

The closest well to the Forest Pad is approximately 5.7 miles away. Operations separated by these distances do not meet the common sense notion of a plant. Therefore, the properties in question are not considered to be on contiguous or adjacent property.

3. According to Antero, no functional dependency exists in that the operation of one (1) well is not dependent on the operation of any other Antero well. Once gas enters the gathering line downstream from Antero’s well pad and metering devices, control of the gas and any associated facilities is beyond Antero’s ownership and control because the

gathering lines, compression facilities, and processing plants are owned and operated by separate legal entities.

Because the facilities are not considered to be on contiguous or adjacent properties and are not fully under control of the same person, the emissions from the Forest Pad should not be aggregated with other facilities in determining major source or PSD status.

MONITORING OF OPERATIONS

Antero will be required to perform the following monitoring associated with this permit application:

1. Monitor and record quantity of natural gas consumed for all combustion sources.
2. Monitor the presence of the pilot flame with a thermocouple or equivalent.
3. Monitor opacity from all fuel burning units.
4. Monitor the tanks to ensure that all vapors are sent to the flare.
5. Monitor the condensate and produced water truck loading to ensure that all vapors are routed to the flare.

Antero will be required to perform the following recordkeeping associated with this modification application:

1. Maintain records of the amount of natural gas consumed in each combustion source.
2. Maintain records of testing conducted in accordance with the permit. Said records shall be maintained on-site or in a readily accessible off-site location
3. Maintain the corresponding records specified by the on-going monitoring requirements of and testing requirements of the permit.
4. Maintain records of the visible emission opacity tests conducted per the permit.
5. Maintain a record of all potential to emit (PTE) HAP calculations for the entire facility. These records shall include the natural gas compressor engines and ancillary equipment.
6. The records shall be maintained on site or in a readily available off-site location maintained by CHK for a period of five (5) years.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates Antero's Forest Pad meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that this location should be granted a 45CSR13 construction permit for this proposed permitting action.

Jerry Williams, P.E.
Engineer

Date