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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3280A
Plant ID No.: 033-00172
Applicant: Antero Midstream, LLC
Facility Name: Bluestone Compressor Station
Location: Salem, Harrison County
NAICS Code: 486210
Application Type: Modification
Received Date: July 22, 2016
Engineer Assigned: Roy F. Kees, P.E.
Fee Amount: \$3,500.00
Date Received: July 25, 2016
Complete Date: August 24, 2016
Due Date: November 24, 2016
Applicant Ad Date: August 12, 2016
Newspaper: *The Exponent Telegram*
UTM's: Easting: 534.947 km Northing: 4,350.034 km Zone: 17
Description: Modification of a natural gas compressor station consisting of replacing the existing compressor engine with one that was formerly permitted at the site.

DESCRIPTION OF PROCESS

Under existing permit R13-3280, one (1) Caterpillar G3516B Compressor is permitted. This modification proposes to replace that engine (CE-4) with one that was formerly at the site and registered under G34-A004A (CE-4, Caterpillar G3516LE).

The following process description was taken from Permit Application R13-3280A:

The Bluestone Compressor Station is located in Harrison County, West Virginia. The facility consists of one (1) 1,265 brake horsepower (bhp) Caterpillar G3516LE compressor engine, one (1) 210 barrel (bbl) produced water tank, one (1) 50 bbl produced water tank, one (1) 25 million standard cubic feet per day (MMSCFD) capacity triethylene glycol (TEG) dehydration unit with a 0.5 MMBtu/hr reboiler, and one (1) horizontal filter separator.

Gas from surrounding pipelines and onsite well enters the facility through one (1) filter separator for the initial separation of production liquids and sales gas. There are no regular emissions associated with the separator other than fugitive component leaks discussed below. Gas from the filter separator is sent to the 1,265 bhp Caterpillar compressor engine (CE-02). Produced water from the filter separator and compressor engine is sent to the 210 bbl produced water tank (T01) and 50 bbl produced water tank (T02). Gas from the compressor engine is sent to the TEG dehydrator (DEHY-001).

The TEG dehydrator (DEHY-001) contains a flash gas tank and 0.5 MMBtu/hr reboiler (RB-1). The dehydrator has a design rate of 25 MMSCFD, but will only process a maximum of 6 MMSCFD. Within the dehydration unit, vent gas from the flash gas tank is routed to the reboiler and used as fuel with an assumed 95% efficiency for combusting the gas. Emissions from the reboiler are routed to the atmosphere. The still vent is equipped with a condenser. Produced water from the dehydrator is routed to the two (2) produced water tanks. The dry gas from the dehydration process is sent to plant discharge.

Produced water is trucked out via tank trucks as needed (LDOUT). The facility produced water production is 210 barrels per day. Fugitive emissions also occur from component leaks and from haul road dust from onsite truck traffic. The compressor engine will undergo venting episodes from regular maintenance including compressor blowdowns.

The N Ritter 1 is a dry gas well owned by Antero Resources Corporation on the same pad as the Bluestone Compressor Station. The well is not covered under R13-3280 since there are no emissions associated with this well as it does not have any associated production equipment and its production is piped to commingle with other compressor station inlet flows.

SITE INSPECTION

A site inspection was not deemed necessary at this time due to the facility being a currently operational natural gas compressor station.

Latitude: 39.29898
Longitude: -80.59471

Directions as given in the permit application are as follows:

From Bridgeport/Clarksburg, take Route 50 West 20 miles. Turn right onto 50/28, and the entrance will be 0.2 miles on the right.



ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this modification application consist of the combustion emissions from one (1) natural gas fired compressor engine (CE-2), which will increase due to the engine being uncontrolled. No other changes will be made to the site.

Emission Unit ID#	Process Equipment	Calculation Methodology
CE-2 (New)	1,265 hp Caterpillar G3516LE Reciprocating Internal Combustion Engine (RICE) w/ SCR	Manufacturer's Data, EPA AP-42 Emission Factors

The total facility PTE for the Bluestone Compressor Station is shown in the following table:

Pollutant	Facility Wide PTE (tons/year) (Existing)	PTE Change for Modification (tons/year)	Facility Wide PTE (tons/year) (Proposed)
Nitrogen Oxides	6.93	+17.77	24.70
Carbon Monoxide	3.46	+19.49	22.95
Volatile Organic Compounds	15.13	-0.03	15.10
Particulate Matter-10/2.5	0.77	-0.03	0.74
Sulfur Dioxide	0.03	0.00	0.03
Formaldehyde	0.56	+1.61	2.17
Total HAPs*	8.73	+1.96	10.69

*including Formaldehyde

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 Appalachia Pipeline LLC – Bluestone Compressor Station (R13-3280A)

Emission Point ID#	Source	NO _x		CO		VOC		PM-10/2.5		SO ₂		Formaldehyde		Total HAPs		CO _{2e} 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	
CE-4	Caterpillar G3516B	5.58	24.43	5.19	22.72	0.73	3.18	0.09	0.41	0.01	0.02	0.50	2.17	0.68	2.96	5758
DEHY-001	Dehydrator Still Vent/Flash Tank	0	0	1.95	8.54	<0.01	0.02	<0.01	0.02	<0.01	<0.01	0	0	1.73	7.57	13.26
RB-1	Dehydrator Reboiler	0.06	0.27	0.05	0.23	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	257
T01, T02	Produced Water Storage Tanks	0	0	0.54	2.38	0	0	0	0	0	0	0	0	0.02	0.1	520
LDOU1	Product Loadout Rack	0	0	0.71	0.14	0	0	0	0	0	0	0	0	0.03	0.01	30
Fugitive	Component Leaks	0	0	0.13	0.58	0	0	0	0	0	0	0	0	0.01	0.03	28
Fugitive	Venting	0	0	-	0.29	-	0.29	0	0	0	0	0	0	-	0.02	62
Total	Total Facility PTE	5.64	24.70	5.24	22.95	4.06	15.10	0.17	0.74	0.01	0.03	0.50	2.17	2.47	10.69	6667

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 reboiler (RB-1) 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.

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 reboiler (RB-1) 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.

Antero paid the appropriate application fee (modification) and published the required legal advertisement for a construction permit application.

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)

Antero is not subject to 45CSR30. The Bluestone Compressor Station is subject to 40CFR60 Subparts JJJJ and 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.

Antero is required to pay the appropriate annual fees and 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.

There is one gas well at this facility, however it was drilled on 5/22/08 and therefore, all requirements regarding gas well affected facilities under 40 CFR 60 Subpart OOOO would not apply.

- a. 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 Bluestone Compressor Station. Therefore, all requirements regarding centrifugal compressors under 40 CFR 60 Subpart OOOO would not apply.

- 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 are reciprocating internal combustion engines located at the Bluestone Compressor Station that were constructed after August 23, 2011. Therefore, the requirements regarding reciprocating compressors under 40 CFR 60 Subpart OOOO will apply. Antero will be required to perform the following:

- Replace the reciprocating compressor rod packing at least every 26,000 hours of operation or 36 months.
- Demonstrate initial compliance by continuously monitoring the number of hours of operation or track the number of months since the last rod packing replacement.
- Submit the appropriate start up notifications.
- Submit the initial annual report for the reciprocating compressors.
- Maintain records of hours of operation since last rod packing replacement, records of the date and time of each rod packing replacement, and records of deviations in cases where the reciprocating compressor was not operated in compliance.

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.

All pneumatic controllers at the facility will be air driven. Therefore, there are no applicable pneumatic controllers which commenced construction after August 23, 2011. Therefore, all requirements regarding pneumatic controllers under 40 CFR 60 Subpart OOOO would not 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 storage vessels located at the Bluestone Compressor Station will have VOC emissions less than 6 TPY for each tank, therefore Antero will not be required to install control devices, however a site-specific sample will need to be tested to prove the emissions are less than 6 TPY within 30 days of startup.

- e. 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 Bluestone Compressor Station is not a natural gas processing plant. Therefore, Leak Detection and Repair (LDAR) requirements for onshore natural gas processing plants would not apply.

- f. 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 Bluestone Compressor Station. Therefore, all requirements regarding sweetening units under 40 CFR 60 Subpart OOOO would not apply.

40CFR63 Subpart HH (National Emission Standards for Hazardous Air Pollutants for Oil and Natural Gas Production Facilities)

Subpart HH establishes national emission limitations and operating limitations for HAPs emitted from oil and natural gas production facilities located at major and area sources of HAP emissions. The glycol dehydration units at the Bluestone Compressor Station are subject to the area source requirements for glycol dehydration units. However, because the facility is an area source of HAP emissions and the actual average benzene emissions from the glycol dehydration unit is below 0.90 megagram per year (1.0 tons/year) it is exempt from all requirements of Subpart HH except to maintain records of actual average flowrate of natural gas to demonstrate a continuous exemption status.

40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines)

Subpart ZZZZ establishes national emission limitations and operating limitations for HAPs emitted from stationary 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 engine (CE-2) at the Bluestone Compressor Station subject to the area source requirements for non-emergency spark ignition engines.

Engine CE-2 is subject to the requirements applicable to an existing stationary RICE. The engine is not subject to 40CFR60 Subpart JJJJ because it was manufactured before July, 2007.

The following rules do not apply to the facility:

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 Bluestone Compressor Station is located in Tyler County, which is an attainment county for all criteria pollutants, therefore the Bluestone Compressor Station is not applicable to 45CSR19.

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

Pollutant	PSD (45CSR14) Threshold (tpy)	NANSR (45CSR19) Threshold (tpy)	Bluestone PTE (tpy)	45CSR14 or 45CSR19 Review Required?
Carbon Monoxide	250	NA	22.95	No
Nitrogen Oxides	250	NA	24.70	No
Sulfur Dioxide	250	NA	0.03	No
Particulate Matter 2.5	250	NA	0.74	No
Ozone (VOC)	250	NA	15.10	No
Greenhouse Gas (CO ₂ e)	100,000	NA	6,667	No

45CSR30 (Requirements for Operating Permits)

Antero is not subject to 45CSR30. The Bluestone Compressor Station is subject to 40CFR60 Subparts JJJJ and 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.

40CFR60 Subpart Kb (Standards of Performance for VOC Liquid Storage Vessels)

40CFR60 Subpart Kb applies to volatile organic liquid storage tanks with a capacity greater than or equal to 75 m³ (§60.110b(a)). Storage vessels with a design capacity less than 1,589.874 m³ do not apply to this subpart if they are used store condensate prior to custody transfer. The condensate and produced water storage tanks at the Bluestone Compressor Station will be 64 m³. The settler tank is 79 m³, but stores condensate prior to custody transfer. Therefore, Subpart Kb does not apply to the Bluestone Compressor Station.

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 Bluestone Compressor Station is not a natural gas processing facility, therefore, Antero is not subject to this rule.

40CFR60 Subpart KKKK (Standards of Performance for Stationary Combustion Turbines)

40CFR60 Subpart KKKK does not apply because there are no stationary combustion turbines at the facility with a heat input at peak load equal to or greater than 10 MMBTU/hr, based on the higher heating value of the fuel (§60.4305).

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

40CFR60 Subpart JJJJ does not apply to the facility because the proposed engine was manufactured before July 2007. However, the engine is a remote existing engine under 40CFR63 Subpart ZZZZ.

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 Bluestone Compressor Station is located in Tyler County and will be operated by Antero.

1. The Bluestone Compressor Station will operate under SIC code 4923 (natural gas distribution). The closest facility owned by Antero Midstream LLC with this SIC code is a compressor station which is 4.5 miles southwest of the facility. All Antero Resources Corporation production facilities operate under the SIC code of 1311 (crude petroleum and natural gas extraction). The closest facility operated by Antero Resources Corporation with the SIC code of 1311 is approximately 2 miles to the southwest.
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 land between the Bluestone Compressor Station and its nearest compressor station operating under the same SIC code is not owned or managed by Antero Midstream LLC. Therefore, the facilities are not considered to be adjacent or contiguous.

3. Common control. Only those facilities that are owned and managed by Antero were included in the aggregation discussion. This includes Antero Resources Corporation production facilities in addition to the Antero Midstream LLC midstream facilities.

Based on this three-pronged evaluation, there are no other existing facilities that should aggregate emissions with Bluestone Compressor Station.

MONITORING OF OPERATIONS

Antero will be required to perform the following monitoring:


- Monitor and record quantity of natural gas consumed for all combustion sources.
- Monitor all applicable requirements of 40CFR60 Subparts OOOO & 40CFR63 Subpart ZZZZ.

Antero will be required to perform the following recordkeeping:

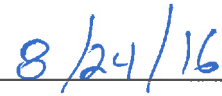
- Maintain records of the amount of natural gas consumed and hours of operation for all engines and combustion sources.
- Maintain records of testing of site-specific liquids sample for Subpart OOOO applicability
- Maintain records of testing conducted in accordance with the permit. Said records shall be maintained on-site or in a readily accessible off-site location
- Maintain the corresponding records specified by the on-going monitoring requirements of and testing requirements of the permit.
- Maintain records of the visible emission opacity tests conducted per the permit.
- 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.
- Maintain records of all applicable requirements of 40CFR60 Subparts OOOO & 40CFR63 Subpart ZZZZ.
- The records shall be maintained on site or in a readily available off-site location maintained by Antero for a period of five (5) years.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that Antero meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Bluestone Compressor Station should be granted a 45CSR13 modification permit for their facility.



Roy F. Kees, P.E.
Engineer – NSR Permitting



Date