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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3184C
Plant ID No.:	095-00037
Applicant:	Antero Midstream LLC (Antero)
Facility Name:	Monroe Compressor Station
Location:	Alma, Tyler County
NAICS Code:	221210 (Natural Gas Distribution)
Application Type:	Modification
Received Date:	January 27, 2016
Engineer Assigned:	Jerry Williams, P.E.
Fee Amount:	$4,500.00
Date Received:	January 27, 2016
Complete Date:	February 18, 2016
Due Date:	May 18, 2016
Applicant Ad Date	January 27, 2016
Newspaper:	*Tyler Star News*
UTM's:	Easting: 511.720 km Northing: 4,363.467 km Zone: 17
Latitude:	39.420649
Longitude:	-80.863842
Description:	This application modifies the engine catalyst efficiencies based on new catalyst information, addition of two (2) new compressor engines, increase the glycol dehydrator throughputs, and remove the fuel limit on the compressor engines. The removal of the fuel limit results in the facility no longer being a synthetic minor.

NON-CONFIDENTIAL

DESCRIPTION OF PROCESS

Permit R13-3184A (Permit Application R13-3184B was withdrawn) was issued to Antero for this facility on April 20, 2015. This proposed permitting action results in the following:

- Updating compressor engine emissions to reflect catalyst data based on a new catalyst design from the manufacturer
- The installation of two new compressor engines and associated blowdown events
- Eliminating the compressor fuel use limit and synthetic minor status
- Increasing the dehydrator throughput to 72.5 MMscfd per dehydrator
- Modifying the dehydrator flash tank control efficiency based on new standardized guidance from WVDEP

The following process description was taken from Permit Application R13-3184C:

The Monroe Compressor Station is located in Tyler County, West Virginia. Gas from surrounding pipelines enters the facility through one (1) receiver and associated slug catcher. From there, the gas is metered and routed through a scrubber and filter separator. Any produced liquids from the scrubber or separator are sent to the 400 barrel settling tank (TK-1502). Gas from the filter separator is sent to one (1) of thirteen (13) 1,680 hp Waukesha compressor engines (C-100 – C-1300). The thirteen (13) compressor engines are controlled with non-selective catalytic reduction (NSCR) catalysts and air-fuel ratio controllers (1C – 11C, 15C, 16C). Produced fluids are routed to the settling tank and gas going to one of the two (2) triethylene glycol (TEG) dehydrators.

Each TEG dehydrator (DEHY1 – DEHY2) contains a flash gas tank and 1.5 million British Thermal Units per hour (MMBtu/hr) reboiler. Each dehydrator has a design rate of 72.5 million standard cubic feet per day (MMscf/day). Within the dehydrator unit, vent gas from the flash gas tank (DFLSH1 – DFLSH2) is routed to the reboiler (DREB1 – DREB2) and used as fuel. In the case where the flash tank gas cannot be used by the reboiler due to excess gas or the reboiler being offline, the gas will be sent to the vapor recovery units (VRUs) (VRU-100 and VRU-200) via the storage tanks (TK-1500 – TK-1502, TK-200 – TK-201) and thus controlled by 98%. Emissions from each reboiler are routed to the atmosphere. The dehydrator still vents (DEHY1 – DEHY2) are controlled by a flare with at least 98% control efficiency (FLARE1). Produced fluids from the dehydrator are routed to the settling tank. The dry gas from the dehydration process is either routed to a fuel gas scrubber, metered, and routed to the compressors as fuel gas or metered and sent to plant discharge.

All produced fluids enter one (1) 400 barrel settling tank (TK-1502) where the fluids settle out as either condensate or produced water. The produced water goes to two (2) 400 barrel produced water tanks (TK-1500 – TK-1501) and the condensate goes to two (2) 400 barrel condensate tanks (TK-200 – TK-201). Flashing only occurs at the settling tank as the fluids stabilize in the settling tank before going to the other storage tanks. All five (5) tanks are connected to a VRU (VRU-100) where tank vapors are collected and recycled back into the gas system right before the initial filter scrubber. A second VRU (VRU-200) is also connected to the tank as a backup unit. The produced fluids are trucked out via tanker trucks as needed (LDOUT1). The

anticipated production is 150 barrels per day of condensate and 45 barrels per day of produced water.

Two (2) natural gas microturbine generators, each rated at 600 kWe, supply power to the facility (GEN1 – GEN2). Each 600 kWe generator is actually comprised of three smaller units, each rated at 200 kWe. All generators (six 200 kWe) are wired together and operation between individual 200 kWe engines will rotate based on functionality of engines. No more than 600 kWe will be operational at any given time, except when units are being switched. Each individual engine will continuously record hours of operation and will be used interchangeably. A small 24,000 Btu/hr catalytic heater (CATHT-1) is used to heat fuel to power the generators.

There are also small storage tanks (1,000 to 2,000 gallons) located at the facility. Their ID number, description, and exact size are listed in the table below. Fugitive emissions from component leaks and emissions from venting or blowdown events also occur.

Tank ID	Storage Tank Description	Storage Tank Capacity (gal)
TK-300	Compressor Skid Settling Tank	1,000
TK-301	Used Oil Tank	1,000
TK-104	TEG Make-Up Tank	1,000
TK-106	Compressor Coolant Tank	2,000
TK-107	Engine Lube Oil Tank	2,000
TK-108	Compressor Lube Oil Tank	2,000

SITE INSPECTION

A site inspection was conducted on September 15, 2015 by Doug Hammell of the DAQ Enforcement Section. According to Mr. Hammell, facility was operating in compliance.

Directions as given in the permit application are as follows:

From Alma, WV on WV-18, turn west on Conaway Run Road (CR 48). After 1.6 miles, the facility entrance in on the right.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this facility consist of the equipment listed in the following table and fugitive emissions. Fugitive emissions for the facility are based on calculation methodologies presented in EPA Protocol for Equipment Leak Emission Estimates. The following table indicates which methodology was used in the emissions determination:

Emission Unit ID#	Process Equipment	Calculation Methodology
C-100 – C-1300	1,680 hp Waukesha 7044 GSI Reciprocating Internal Combustion Engine (RICE) w/ NSCR	Manufacturer's Data, EPA AP-42 Emission Factors
GEN1, GEN2	600 kW Capstone C200 NG Microturbine Generators	Manufacturer's Data, EPA AP-42 Emission Factors
CATHT1	0.024 MMBTU/hr Catalytic Heater	EPA AP-42 Emission Factors
DEHY1, DEHY2	72.5 mmscfd TEG Dehydrator Still Vent w/ Condenser/Recycle and Flare	GRI-GlyCalc 4.0
DREB1, DREB2	1.5 MMBtu/hr TEG Dehydrator Reboiler	EPA AP-42 Emission Factors
TK-1500, TK-1501	400 bbl (16,800 gal) Produced Water Storage Tanks	EPA Tanks 4.09d
TK-1502	400 bbl (16,800 gal) Produced Water/Condensate Settling Tank	EPA Tanks 4.09d and ProMax Simulation (Flashing)
TK-200, TK-201	400 bbl (16,800 gal) Condensate Storage Tanks	EPA Tanks 4.09d
TK-300	1,000 gal Compressor Skid Settling Tank	Negligible
TK-301	1,000 gal Used Oil Tank	Negligible
TK-104	1,000 gal TEG Make-Up Tank	Negligible
TK-106	2,000 gal Compressor Coolant Tank	Negligible
TK-107	2,000 gal Engine Lube Oil Tank	Negligible
TK-108	2,000 gal Compressor Lube Oil Tank	Negligible
LDOUT1	71,175 bbl/yr (2,989,350 gal/yr) Product Loadout Rack	EPA AP-42 Emission Factors
VRU-100	Vapor Recovery Unit #1	Electric Driven
VRU-200	Vapor Recovery Unit #2	Electric Driven
FLARE1	4.8 MMBTU/hr Flare Control Device	EPA AP-42 Emission Factors

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

Emission Unit	Pollutant	Control Device	Control Efficiency
1,680 hp Waukesha 7044 GSI RICE w/ NSCR (C-100 – C-1300)	Nitrogen Oxides	NSCR	97.5 %
	Carbon Monoxide		97.5 %
	Volatile Organic Compounds		84 %
	Formaldehyde		90 %
	Methane		70 %
72.5 mmscfd TEG Dehydrator Still Vents (DEHY1, DEHY2)	Volatile Organic Compounds	Flare	98 %
	Hazardous Air Pollutants		98 %
72.5 mmscfd TEG Dehydrator Flash Tanks	Volatile Organic Compounds	Recycled Reboiler/ Condenser w VRU backup	98 %
	Hazardous Air Pollutants		98 %
Product Tanks (T01 – T05)	Volatile Organic Compounds	Vapor Recovery Units	98 %
	Hazardous Air Pollutants		98 %

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

Pollutant	R13-3184A PTE (tons/year)	R13-3184C PTE (tons/year)	PTE Change (tons/year)
Nitrogen Oxides	92.60	76.46	-16.14
Carbon Monoxide	94.00	79.17	-14.83
Volatile Organic Compounds	87.65	65.03	-22.62
Particulate Matter-10	12.04	15.87	3.83
Sulfur Dioxide	0.46	0.57	0.11
Total HAPs	11.12	12.79	1.67
Carbon Dioxide Equivalent	95,739	122,598	26,859

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 Midstream LLC –Monroe Compressor Station (R13-3184C)

Emission	Source	NO_x		CO		VOC		PM-10		SO_2		Formaldehyde		Total HAPs		CO2e
Point ID#		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	ton/year
1E	Compressor Engine #1	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
2E	Compressor Engine #2	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
3E	Compressor Engine #3	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
4E	Compressor Engine #4	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
5E	Compressor Engine #5	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
6E	Compressor Engine #6	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
7E	Compressor Engine #7	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
8E	Compressor Engine #8	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
9E	Compressor Engine #9	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
10E	Compressor Engine #10	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
11E	Compressor Engine #11	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
28E	Compressor Engine #12	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
29E	Compressor Engine #13	1.27	5.56	1.18	5.15	0.27	1.19	0.27	1.18	<0.01	0.04	0.02	0.08	0.18	0.81	8731
12E, 13E	Microturbine Generators	0.24	1.11	0.66	3.06	0.06	0.28	0.04	0.19	0.02	0.10	<0.01	0.02	<0.01	0.03	3698
16E	Dehydrator Reboiler	0.18	0.81	0.15	0.68	0.01	0.04	0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	771
19E	Dehydrator Reboiler	0.18	0.81	0.15	0.68	0.01	0.04	0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	771
26E	Flare Combustion	0.33	1.44	1.78	7.79	2.42	10.64	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.34	1.52	2893
20E	Settling Storage Tank	0.00	0.00	0.00	0.00	2.65	11.61	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.36	29
21E, 22E	Condensate Storage Tanks	0.00	0.00	0.00	0.00	0.05	0.21	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	<0.01	2
23E, 24E	Produced Water Storage Tanks	0.00	0.00	0.00	0.00	<0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	<0.01	<1
37E	Product Loadout Rack	0.00	0.00	0.00	0.00	77.54	8.15	0.00	0.00	0.00	0.00	0.00	0.00	2.42	0.25	2
47E	Catalytic Heater	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12
Total Point Source		**17.44**	**76.46**	**18.08**	**79.17**	**86.25**	**46.46**	**3.58**	**15.65**	**0.13**	**0.57**	**0.25**	**1.07**	**5.21**	**12.74**	**121685**
Fugitive	Component Leaks	0.00	0.00	0.00	0.00	1.79	7.84	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	0.02	140
Fugitive	Venting	0.00	0.00	0.00	0.00	NA	10.73	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.03	773
Fugitive	Dust	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0
Total Fugitive		**0.00**	**0.00**	**0.00**	**0.00**	**1.79**	**18.57**	**0.00**	**0.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**913**
Total Sitewide		**17.44**	**76.46**	**18.08**	**79.17**	**88.04**	**65.03**	**3.58**	**15.87**	**0.13**	**0.57**	**0.25**	**1.07**	**5.21**	**12.79**	**122598**

REGULATORY APPLICABILITY

The following rules apply to this modification:

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)

A 45CSR13 modification permit applies to this source due to the fact that Antero is subject to a substantive requirement under 40CFR60 Subparts JJJJ, OOOO and 40CFR63 Subpart HH. Antero is no longer a synthetic minor due to the increased efficiency of the engine catalysts for nitrogen oxides.

Antero paid the appropriate application fee 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, Subparts JJJJ and OOOO. These requirements are discussed under that rule below.

45CSR22 (Air Quality Management Fee Program)

Antero is not subject to 45CSR30. The Monroe 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 JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE))

40CFR60 Subpart JJJJ establishes emission standards for applicable SI ICE.

The 1,680 hp Waukesha 7044 GSI RICEs (C-1200, C-1300) were manufactured after the July 1, 2007 date for engines with a maximum rated power capacity greater than or equal to 500 hp.

The 1,680 hp Waukesha 7044 GSI RICEs (C-1200, C-1300) will be subject to the following emission limits: NOx – 1.0 g/hp-hr (3.70 lb/hr); CO – 2.0 g/hp-hr (7.41 lb/hr); and VOC – 0.7 g/hp-hr (2.59 lb/hr). Based on the manufacturer's specifications for these engines, the emission standards will be met.

The 1,680 hp Waukesha 7044 GSI RICEs (C-100 – C-1300) are not certified by the manufacturer to meet the emission standards listed in 40CFR60 Subpart JJJJ. Therefore, Antero will be required to conduct an initial performance test and conduct subsequent

performance testing every 8,760 hours or three (3) years, whichever comes first, to demonstrate compliance.

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

There are no gas wells at this facility. 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 Monroe 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 Monroe 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 or installation of a rod packing emissions collection system.

- 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 Monroe Compressor Station are controlled by a VRU which will reduce the potential to emit to less than 6 tpy of VOC. Therefore, Antero is not required by this section to further reduce VOC emissions by 95%. Antero is claiming a control efficiency of 98% for the VRU. In able to claim a control efficiency greater than 95%, Antero is required to meet additional design/function requirements. Antero will be required to perform three (3) of the following additional requirements:

- *Additional sensing equipment.*
- *Properly designed bypass system.*
- *Appropriate gas blanket.*
- *A compressor that is suitable and has the ability to vary the drive speed.*

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 Monroe 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 (H_2S) 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 Monroe 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 Monroe 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 engines (CE-01 – CE-13) at the Monroe Compressor Station are subject to the area source requirements for non-emergency spark ignition engines.

The applicability requirements for new stationary RICEs located at an area source of HAPs, is the requirement to meet the standards of 40CFR60 Subpart JJJJ. These requirements were outlined above. The proposed engine meets these standards.

Because these engines are not certified by the manufacturer, Antero will be required to perform an initial performance test within 180 days from startup, and subsequent testing every 8,760 hours or 3 years, whichever comes first.

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

As shown in the following table, Antero is not a major source subject to 45CSR14 or 45CSR19 review. According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, the fugitive emissions are not included in the PTE below.

Pollutant	**PSD (45CSR14) Threshold (tpy)**	**NANSR (45CSR19) Threshold (tpy)**	**Monroe PTE (tpy)**	**45CSR14 or 45CSR19 Review Required?**
Carbon Monoxide	250	NA	79.17	No
Nitrogen Oxides	250	NA	76.46	No
Sulfur Dioxide	250	NA	0.57	No
Particulate Matter 2.5	250	NA	15.65	No
Ozone (VOC)	250	NA	46.46	No

45CSR30 (Requirements for Operating Permits)

Antero is not subject to 45CSR30. The Monroe 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 does not apply to storage vessels with a capacity less than 75 cubic meters. The largest 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 Monroe 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).

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. The Monroe Compressor Station is classified as an area source of hazardous air pollutants. Listed below is a description of the primary hazardous air pollutants for this facility.

Acetaldehyde

Acetaldehyde is mainly used as an intermediate in the synthesis of other chemicals. It is common in the environment and may be formed in the body from the breakdown of ethanol. Acute (short-term) exposure to acetaldehyde results in effects including irritation of the eyes, skin, and respiratory tract. Symptoms of chronic (long-term) intoxication of acetaldehyde resemble those of alcoholism. Acetaldehyde is considered a probable human carcinogen (Group B2) based on human cancer studies and animal studies that have shown nasal tumors in rats and laryngeal tumors in hamsters.

Acrolein
Acrolein is primarily used as an intermediate in the synthesis of acrylic acid and as a biocide. It may be formed from the breakdown of certain pollutants in outdoor air or from the burning of organic matter including tobacco, or fuels such as gasoline or oil. It is toxic to humans following inhalation, oral or dermal exposures. Acute (short-term) inhalation exposure may result in upper respiratory tract irritation and congestion. No information is available on its reproductive, developmental, or carcinogenic effects in humans, and the existing animal cancer data are considered inadequate to make a determination that acrolein is carcinogenic to humans.

Benzene
Benzene is found in the air from emissions from burning coal and oil, gasoline service stations, and motor vehicle exhaust. Acute (short-term) inhalation exposure of humans to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic (long-term) inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia, in occupational settings. Reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in animal tests. Increased incidence of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. EPA has classified benzene as a Group A, human carcinogen

Formaldehyde
Formaldehyde is used mainly to produce resins used in particle board products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).

Methanol
Methanol is released to the environment during industrial uses and naturally from volcanic gases, vegetation, and microbes. Exposure may occur from ambient air and during the use of solvents. Acute (short-term) or chronic (long-term) exposure of humans to methanol by inhalation or ingestion may result in blurred vision, headache, dizziness, and nausea. No information is available on the reproductive, developmental, or carcinogenic effects of methanol in humans. Birth defects have been observed in the offspring of rats and mice exposed to methanol by inhalation. EPA has not classified methanol with respect to carcinogenicity.

Methanol is primarily used as an industrial solvent for inks, resins, adhesives, and dyes. It is also used as a solvent in the manufacture of cholesterol, streptomycin, vitamins, hormones, and other pharmaceuticals. Methanol is also used as an antifreeze for automotive radiators, an ingredient of gasoline (as an antifreezing agent and octane booster), and as fuel for picnic stoves. Methanol is also an ingredient in paint and varnish removers. Methanol is also used as an alternative motor fuel.

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects 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*.

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

1. The Monroe Compressor Station will operate under SIC code 4923 (Natural Gas Distribution). There are other facilities operated by Antero that share the same two-digit major SIC code of 49 for natural gas distribution. Therefore, the Monroe Compressor Station does share the same SIC code as other Antero facilities.

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.

   There are no Antero properties in question that are considered to be on contiguous or adjacent property with the Monroe Compressor Station.

3. Common control. The natural gas well sites that supply the incoming natural gas streams to the Monroe Compressor Station are owned and operated by Antero Resources.

Because the facilities are not considered to be on contiguous or adjacent properties, the emissions from the Monroe Compressor Station 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:

- Monitor and record quantity of natural gas consumed for all engines and combustion sources.
- Monitor all applicable requirements of 40CFR60 Subparts JJJJ and OOOO and 40CFR63 Subpart HH.
- Monitor the presence of the flare pilot flame with a thermocouple or equivalent.

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 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 JJJJ and OOOO and 40CFR63 Subpart HH.
- Maintain records of the flare design evaluation.
- 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.

CHANGES TO PERMIT R13-3184A

- Section 1.0 (Emission Units) – Addition of compressor engines (CE-1200 and CE-1300)
- Section 1.0 (Emission Units) – Increase throughput to TEG dehydrators (DEHY1 and DEHY2)
- Section 1.0 (Emission Units) – Modified product loadout throughput
- Section 1.1 (Control Devices) – Modified control efficiencies for engine catalysts and flash tanks to account for VRU backup
- Section 4.1 – Updated LDAR language
- Section 5.0 – Eliminated annual limitation of natural gas consumption rate for engines (C-100 – C-1100). Due to the increased efficiencies of engine catalysts, this synthetic limit is no longer necessary.
- Section 5.0 – Added the two (2) new engines
- Section 5.1.1 – Change in emission limits due to operational conditions of NSCR and annual throughput limitation

- Section 5.1.2 – Updated the maximum yearly operation limitation language for the two (2) microturbines to reflect each 600 kW unit being comprised of 3-200 kW units.
- Section 6.1.1 – Change in throughput for the glycol dehydration units (DEHY1, DEHY2)
- Section 6.1.2 – Change in emission limits due to the increased throughput of the glycol dehydration units (DEHY1, DEHY2)
- Section 8.1.4 – Increase in VOC emissions from Settling Tank T03 to account for ProMax estimation method in lieu of VBE.
- Section 10.0 – Added the two (2) new engines
- Section 11.0 – Added the two (2) new engines
- Section 12.0 – Added the two (2) new engines

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 Monroe Compressor Station should be granted a 45CSR13 modification permit for their facility.

Jerry Williams, P.E.
Engineer

MAR 10, 2016
Date