



**west virginia** department of environmental protection

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**ENGINEERING EVALUATION / FACT SHEET**

**BACKGROUND INFORMATION**

Application No.: R13-3281  
Plant ID No.: 095-00033  
Applicant: Antero Resources Appalachian Corporation (Antero)  
Facility Name: Underwood Compressor Station  
Location: Centerville, Tyler County  
NAICS Code: 221210 (Natural Gas Distribution)  
Application Type: Construction  
Received Date: November 13, 2015  
Engineer Assigned: Roy F. Kees, P.E.  
Fee Amount: \$4,500.00  
Date Received: November 18, 2015  
Complete Date: December 14, 2015  
Due Date: March 14, 2015  
Applicant Ad Date: November 25, 2015  
Newspaper: *Tyler Star News*  
UTM's: Easting: 511.052 km      Northing: 4,364.783 km      Zone: 17  
Description: Installation and operation of a natural gas compressor station.

**Promoting a healthy environment.**

## DESCRIPTION OF PROCESS

The following process description was taken from Permit Application R13-3281:

The proposed Underwood Compressor Station will be located in Tyler County, West Virginia. Gas from surrounding pipelines will enter the facility through one (1) receiver and associated slug catcher. From there, the gas is metered and routed through a filter separator. Any produced liquids from the scrubber or separator are sent to the 500 barrel settling tank (TK-9000). Gas from the filter separator is sent to one (1) of eleven (11) 1680 hp compressor engines (C-2100 – C-2200). The eleven (11) compressor engines are controlled with NSCR catalysts and air-fuel ratio controllers (1C – 11C). Produced fluids are routed to the settling tank and high pressure gas is sent to one of the two (2) TEG dehydrators.

Each TEG dehydrator contains a flash gas tank (FT-3110 & FT-3210) and 1.5 MMBtu/hr reboiler (R-3110 & R-3210). Each dehydrator has a design rate of 60 MMscf/day. Within the dehydrator unit, vent gas from the flash gas tank (FT-3110 & FT-3210) is routed to the reboiler (R-3110 & R-3210) and used as fuel, with an assumed 95% efficiency for combusting the gas. Combustion emissions from each reboiler are routed to the atmosphere. The dehydrator still vents (SV-3110 & SV-3210) are controlled by a flare with at least 98% control efficiency (FL-1000). 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 the high pressure facility discharge pipeline.

All produced fluids enter one (1) 500 barrel settling tank (TK-9000) where the fluids settle out as either condensate or produced water. The produced water goes to two (2) 400 barrel produced water tanks (TK-9200 – TK-9210) and the condensate goes to two (2) 400 barrel condensate tanks (TK-9100 – TK-9110). 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 primary vapor recovery unit (VRU-6000) where tank vapors are collected and recycled back into the gas system right before the initial filter scrubber. A second vapor recovery unit (VRU-6100) is used as back-up to the primary vapor recovery unit. The produced fluids are trucked out via tanker trucks as needed (LDOUT1). The loading emissions are uncontrolled. The anticipated production is 150 barrels per day of condensate and 45 barrels per day of produced water.

One (1) 600 kWe microturbine generator will be used at the facility. The Capstone C600 unit is comprised of three (3) 200 kWe units that can be operated individually. Likely, all three units will not be operating 8,760 hours per year; however, emissions were calculated as such for maximum flexibility. The fuel line for the generators will be heated by a small catalytic heater (CATH1) with a burner rating of 24 Btu/hr.

Fugitive emissions from component leaks and emissions from venting or blowdown events will also occur.

## SITE INSPECTION

A site inspection was conducted on December 15, 2015 by James Robertson of the DAQ Enforcement Section. "I was not able to get to the exact site due to a gate located on the county road, but I was near the access point to the site off Wheeler's Run. This site is located on top of a hill in a relatively remote location. There are few houses in the vicinity of the proposed compressor station. There is heavy drilling and pipeline activity in the area.

In my opinion this site is suitable for a NSR Permit."

Latitude: 39.432517

Longitude: -80.871583

Directions as given in the permit application are as follows:

*From Centerville, WV, head west on Wheelers Run Road for approximately 1.6 miles. Turn left into the facility driveway.*



ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this construction application consist of the combustion emissions from eleven (11) natural gas fired compressor engines (C-2100 – C-2200), one (1) microturbine generators (G8000), two (2) TEG dehydrator still vents (SV-3110, SV-3210), two (2) TEG dehydrator reboilers (R3110, R-3210), two (2) dehydrator flash tanks (FT-3110, FT-3210), one (1) 500 bbl and four (4) 400 bbl (16,800 gal) tanks (settling, condensate, produced water) (TK-9000, TK-9200, TK-9210, TK-9100, TK-9110), nine (9) miscellaneous storage tanks (oily water, used oil, TEG, compressor coolant, two (2) lube oil), one (1) product loadout rack (LDOUT1), one (1) flare (FL-1000), two (2) vapor recovery units (VRU-6000, VRU-6100) 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:

<b>Emission Unit ID#</b>	<b>Process Equipment</b>	<b>Calculation Methodology</b>
C-2100 – C-2200	1,680 hp Waukesha 7044 GSI Reciprocating Internal Combustion Engine (RICE) w/ NSCR	Manufacturer's Data, EPA AP-42 Emission Factors
G8000	600 kW Capstone C600 NG Microturbine Generator	Manufacturer's Data, EPA AP-42 Emission Factors
CATHT1	0.024 MMBTU/hr Catalytic Heater	EPA AP-42 Emission Factors
SV-3110, SV-3210	60 mmscfd TEG Dehydrator Still Vent w/ Condenser/Recycle and Flare	GRI-GlyCalc 4.0
R-3110, R-3210	1.5 MMBtu/hr TEG Dehydrator Reboiler	EPA AP-42 Emission Factors
TK-9000	500 bbl (21,000 gal) Produced Water/Condensate Settling Tank	EPA Tanks 4.09d and Gas Oil Ratio Method (Flashing)
TK-9200, TK-9210	400 bbl (16,800 gal) Condensate Storage Tanks	EPA Tanks 4.09d
TK-9100, TK-9110	400 bbl (16,800 gal) Produced Water Storage Tanks	EPA Tanks 4.09d
TK-9300, TK-9320	(2) 1,000 gal Compressor Skid Oily Water Storage Tanks	Negligible
TK-9310, TK-9330	(2) 500 gal Used Oil Storage Tank	Negligible
TK-9410	1,000 gal TEG Make-Up Storage Tank	Negligible
TL-9420	2,000 gal Compressor Coolant Storage Tank	Negligible
TK-9430	2,000 gal Engine Lube Oil Storage Tank	Negligible
TK-9440	2,000 gal Compressor Lube Oil Storage Tank	Negligible
TK-9400	4,200 gal Compressor Waste Oil Storage Tank	Negligible
LDOUT1	195 bbl (8,190 gal) / day 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	9.2 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- 2100 – C-2200)	Nitrogen Oxides	NSCR	>96 %
	Carbon Monoxide		>96 %
	Volatile Organic Compounds		>50 %
	Formaldehyde		>76 %
60 mmscfd TEG Dehydrator Still Vents (SV-3110, SV- 3210)	Volatile Organic Compounds	Condenser and Combustion Recycle	98 %
	Hazardous Air Pollutants		98 %

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

Pollutant	Facility Wide PTE (tons/year)
Nitrogen Oxides	82.19
Carbon Monoxide	87.93
Volatile Organic Compounds	88.78
Particulate Matter-10/2.5	12.62
Sulfur Dioxide	0.45
Formaldehyde	1.94
Total HAPs	11.39
Carbon Dioxide Equivalent	97,571

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 – Underwood Compressor Station (R13-3281)

Emission Point ID#	Source	NO <sub>x</sub>		CO		VOC		PM-10/2.5		SO <sub>2</sub>		Formaldehyde		Total HAPs		CO <sub>2</sub> e 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	
1E	Compressor Engine #1	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
2E	Compressor Engine #2	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
3E	Compressor Engine #3	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
4E	Compressor Engine #4	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
5E	Compressor Engine #5	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
6E	Compressor Engine #6	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
7E	Compressor Engine #7	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
8E	Compressor Engine #8	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
9E	Compressor Engine #9	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
10E	Compressor Engine #10	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
11E	Compressor Engine #11	1.78	6.98	1.65	6.47	0.87	3.42	0.27	1.06	0.01	0.03	0.04	0.17	0.21	0.83	7,845
12E	Microturbine Generator #1	0.24	1.05	0.66	2.89	0.06	0.26	0.04	0.18	0.02	0.1	<0.01	0.02	<0.01	0.03	3,499
13E	Dehydrator Still Vent #1	0	0	0	0	0.32	1.42	0	0	0	0	0	0	0.15	0.65	39
14E	Dehydrator Flash Tank #1	0	0	0	0	1.61	7.07	0	0	0	0	0	0	0.03	0.15	301
15E	Dehydrator Reboiler #1	0.18	0.81	0.15	0.68	0.01	0.05	0.02	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	771
16E	Dehydrator Still Vent #2	0	0	0	0	0.32	1.42	0	0	0	0	0	0	0.15	0.65	39
17E	Dehydrator Flash Tank #2	0	0	0	0	1.61	7.07	0	0	0	0	0	0	0.03	0.15	301
18E	Dehydrator Reboiler #2	0.18	0.81	0.15	0.68	0.01	0.05	0.02	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	771
25E	Flare Combustion	0.63	2.75	2.86	12.51	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4,744
19E	Settling Storage Tank	0	0	0	0	2.54	11.11	0	0	0	0	0	0	0.08	0.34	29
20E, 21E	Condensate Storage Tanks	0	0	0	0	0.06	0.28	0	0	0	0	0	0	<0.01	<0.01	1
22E, 23E	Produced Water Storage Tanks	0	0	0	0	<0.01	<0.01	0	0	0	0	0	0	<0.01	<0.01	<0.01
LDOU1	Product Loadout Rack	0	0	0	0	52.65	7.94	0	0	0	0	0	0	0.13	0.02	<0.01
DM	Catalytic Space 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
Fugitive	Component Leaks	0	0	0	0	1.01	4.42	0	0	0	0	0	0	0.02	0.09	99
Fugitive	Venting	0	0	0	0	-	9.9	0	0	0	0	0	0	-	0.16	672
<b>Total</b>	<b>Total Facility PTE</b>	<b>20.77</b>	<b>82.19</b>	<b>21.94</b>	<b>87.93</b>	<b>69.83</b>	<b>88.78</b>	<b>3.19</b>	<b>12.62</b>	<b>0.11</b>	<b>0.45</b>	<b>0.49</b>	<b>1.94</b>	<b>2.91</b>	<b>11.39</b>	<b>97571</b>

## 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 reboilers (R-3110, R-3210) 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.

### **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 proposed to have 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 161 pounds of particulate matter per hour (assuming a natural gas density of 0.044 lb/ft<sup>3</sup>). The flare has negligible hourly particulate matter emissions. 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)**

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 reboilers (R-3110, R-3210) 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, and they are also subject to a substantive requirement of an emission control rule promulgated by the Secretary (45CSR6, 40CFR60 Subparts JJJJ and OOOO).

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 Underwood 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 RICE (C-2100 – C-2200) were manufactured after the July 1, 2007 date for engines with a maximum rated power capacity greater than or equal to 500 hp.

The proposed 1,680 hp Waukesha 7044 GSI RICE (C-2100 – C-2200) will be subject to the following emission limits: NO<sub>x</sub> – 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 proposed 1,680 hp Waukesha 7044 GSI RICE (C-100 – C-1100) 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**

**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<sub>2</sub>) 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 Underwood 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 Underwood 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 Underwood Compressor Station will be 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 Underwood 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<sub>2</sub>S) 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 Underwood 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 Underwood 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 (C-100 – C-1100) at the Underwood 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 will not be 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 Underwood Compressor Station is located in Tyler County, which is an attainment county for all criteria pollutants, therefore the Underwood 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)	Underwood PTE (tpy)	45CSR14 or 45CSR19 Review Required?
Carbon Monoxide	250	NA	87.93	No
Nitrogen Oxides	250	NA	82.19	No
Sulfur Dioxide	250	NA	0.45	No
Particulate Matter 2.5	250	NA	12.62	No
Ozone (VOC)	250	NA	88.78	No
Greenhouse Gas (CO <sub>2</sub> e)	100,000	NA	97,571	No

**45CSR30** (Requirements for Operating Permits)

Antero is not subject to 45CSR30. The Underwood 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 m<sup>3</sup> (§60.110b(a)). Storage vessels with a design capacity less than 1,589.874 m<sup>3</sup> 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

Underwood 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 Underwood 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 Underwood 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**

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

1. The Underwood Compressor Station will operate under SIC code 4923 (natural gas distribution). The closest facility owned by Antero Midstream LLC with this SIC code is the Monroe Compressor station which is 4,902 feet southeast 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 the Dale Pad 2,520 feet to the east.
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 Underwood Compressor Station and its nearest facility operating under SIC code 4923 is not owned or managed by Antero Midstream LLC or Antero Resources Corporation. Therefore, the two facilities are not contiguous or adjacent. Secondly, although most of the Underwood Compressor Station land parcel border is not adjacent to any parcels operated by Antero, a small portion of the Underwood Compressor Station land parcel is adjacent to the land parcel for the Dale Pad facility operating under 1311. The actual pad locations for the Underwood Compressor Station and the Dale Pad are 2,520 feet apart and thus not 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, although the Underwood Compressor Station and Monroe Compressor Station do belong to the same major industrial group, they should not be aggregated because they are not contiguous or adjacent. Although a small portion of their land parcel borders are adjacent, the Underwood Compressor Station and Dale Pad should not be aggregated because they do not belong to the same major industrial group and do not directly rely on each other nor are they contiguous.

## 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.
- 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.
- 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.

## 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 Underwood Compressor Station should be granted a 45CSR13 construction permit for their facility.

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

12/17/15  
\_\_\_\_\_  
Date