west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3201
Plant ID No.:	017-00114
Applicant:	Antero Midstream LLC
Facility Name:	Nichols Compressor Station
Location:	Pennsboro, Doddridge County
SIC Code:	4922
NAICS Code:	486210
Application Type:	Construction
Received Date:	July 31, 2014
Engineer Assigned:	Laura Jennings
Fee Amount:	$4,500
Date Received:	August 5, 2014
Complete Date:	October 23, 2014
Due Date:	January 21, 2015
Applicant Ad Date:	July 22, 2014
Newspaper:	*The Herald Record*
UTM's:	Easting: 511.253 km Northing: 4349.253 km Zone: 17
Description:	Installation and operation of a new natural gas compressor station.

DESCRIPTION OF PROCESS

Natural gas from the field gathering system will enter the station through a slug catcher to remove pipeline condensate and then pass through station inlet metering. The gas then enters a filter separator to remove solids and entrained liquids, and is then sent to the compressors where the gas is compressed and discharged to the discharge header.

The compressed gas is directed to two coalescing filter separators and then allowed to pass through the TEG dehydrator units where it is dehydrated to the desired level. The dehydrator still vent gases are sent to the flare for destruction. Lastly, the process gas is sent through small vertical conditioning scrubbers and final custody transfer metering before leaving the compressor station.

A portion of the gas is withdrawn after dehydration but before the station outlet metering

and sent to the fuel gas system. The fuel gas is directed through a fuel gas scrubber and metering before being directed to the compressor engines and other gas-powered equipment.

All of the condensate and produced water that enters the station from pigging or drops out in vessels is routed to a tank battery. The combined liquids are directed to a settling tank for natural separation and then directed to homogeneous tanks for holdup. All of the water tanks are connected to vapor recovery units for 98% vapor control. Compressor waste oil is directed to a waste oil tank.

The proposed facility has eleven (11) compressor units, two (2) TEG dehydration units, three (3) coalescing filter separators, one (1) flare control device for the dehydrator still vapors, and thirteen (13) tanks associated with the operations at the facility. The vapors from the production tanks (400 BBL tanks) are routed to two (2) vapor recovery units; this includes the produced water and the condensate tanks.

The thirteen (13) storage tanks included five (5) 400 BBL tanks to hold any produced water and/or condensate from the facility. There are eight (8) smaller 1000 gallon tanks used for bulk storage (one for a compressor skid settling tank, one for bulk TEG storage, one for bulk lube oil storage, one for waste oil storage, one for bulk coolant storage, one for compressor skid oily water, one for sump collection, and one for jacket water storage). Other miscellaneous associated equipment as necessary for normal operations are also located at the facility.

SCHEDULE - The Nichols Compressor Station will be a new facility located in Dodridge County, WV approximately 7.6 miles east of Pennsboro, WV. Ground clearing and other site preparation activities are anticipated to occur from October 2014. Installation of equipment is anticipated to begin upon permit approval. Facility operations are scheduled to begin on December 31, 2014.

Emission Units Table:

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type and Date of Change	Control Device
C-01	1E	#1 Flare Control Device (SFI)	2014	4.8 MMBTU/hr; 98% efficiency	New	N/A
C-02	2E	#1 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-03	3E	#2 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A

C-04	4E	#3 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-05	5E	#4 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-06	6E	#5 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-07	7E	#6 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-08	8E	#7 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-09	9E	#8 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-10	10E	#9 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-11	11E	#10 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-12	12E	#11 Catalyst Control (Emit Technologies ELH-4200-1616F-6CEE-361)	2014	NOX - 99% CO - 98% VOC - 50% HCHO - 76%	New	N/A
C-13	13E	#1 Vapor Recovery Unit w/ Electric Engine (Hy-Bon HB-NK60-15-36DV)	2014	46 MSCFD; 98% capture efficiency	New	None
C-14	14E	#2 Vapor Recovery Unit w/ Electric Engine (Hy-Bon HB-NK60-15-36DV)	2014	46 MSCFD; 98% capture efficiency	New	None
CE-01	15E	Compression Unit #1 Waukesha L7044GSI	2014	1680 hp	New	C-02

CE-02	16E	Compression Unit #2 Waukesha L7044GSI	2014	1680 hp	New	C-03
CE-03	17E	Compression Unit #3 Waukesha L7044GSI	2014	1680 hp	New	C-04
CE-04	18E	Compression Unit #4 Waukesha L7044GSI	2014	1680 hp	New	C-05
CE-05	19E	Compression Unit #5 Waukesha L7044GSI	2014	1680 hp	New	C-06
CE-06	20E	Compression Unit #6 Waukesha L7044GSI	2014	1680 hp	New	C-07
CE-07	21E	Compression Unit #7 Waukesha L7044GSI	2014	1680 hp	New	C-08
CE-08	22E	Compression Unit #8 Waukesha L7044GSI	2014	1680 hp	New	C-09
CE-09	23E	Compression Unit #9 Waukesha L7044GSI	2014	1680 hp	New	C-10
CE-10	24E	Compression Unit #10 Waukesha L7044GSI	2014	1680 hp	New	C-11
CE-11	25E	Compression Unit #11 Waukesha L7044GSI	2014	1680 hp	New	C-12
GEN-1	26E	Microturbine #1 Capstone C200	2014	200 kW	New	None
GEN-2	27E	Microturbine #2 Capstone C200	2014	200 kW	New	None
RBV-1	28E	#1 Dehy Regenerator Flame Exhaust	2014	1.5 MMBTU/hr	New	None
RSV-1	29E	#1 Dehy Gaseous Still Vent (Valerus GLY-GCR-1.5MM)	2014	60 MMSCFD	New	C-01
RBV-2	30E	#2 Dehy Regenerator Flame Exhaust (Valerus GLY-GCR-1.5MM	2014	1.5 MMBTU/hr	New	None
RSV-2	31E	#2 Dehy Gaseous Still Vent	2014	60 MMSCFD	New	C-01
T01	32E	#1 Produced Water Tank	2014	400 BBL	New	C-13, C-14
T02	33E	#2 Produced Water Tank	2014	400 BBL	New	C-13, C-14
T03	34E	#3 Settling Tank	2014	400 BBL	New	C-13, C-14

T04	35E	#4 Condensate Tank	2014	400 BBL	New	C-13, C-14
T05	36E	#5 Condensate Tank	2014	400 BBL	New	C-13, C-14
EPLOR	37E	Truck Load Out	2014	55,079 bbl/yr Condensate 16,316 bbl/yr Prod. Water	New	None
TK-9440	38E	Compressor Skid Settling Tank	2014	1,000 Gallons	New	None
TK-9410	39E	Bulk TEG Storage Tank	2014	1,000 Gallons	New	None
TK-9430	40E	Bulk Lube Oil Storage Tank	2014	1,000 Gallons	New	None
TK-9330	41E	Used Oil Storage Tank	2014	1,000 Gallons	New	None
TK-9420	42E	Bulk Coolant Storage Tanks	2014	1,000 Gallons	New	None
TK-9300	43E	Compressor Skid Oily Water Tank	2014	1,000 Gallons	New	None
TK-9310	44E	Sump Collection Tank	2014	1,000 Gallons	New	None
TK-9320	45E	Jacket Water Storage Tank	2014	1,000 Gallons	New	None
TK-9400	46E	Compressor Waste Oil Tank	2014	4,200 Gallons	New	None

SITE INSPECTION

Doug Hammell of DAQ's compliance and enforcement section conducted a site inspection of the site on August 7, 2014 and stated that the site is suitable for the R13-3201 permit.

Doug provided the following updated directions: Take US-50 towards Greenwood, WV; NW on CR-50/30 (Sunnyside Rd) for 0.3 mi; East (1st right) on CR-36 (Duckworth Rd) for 1.0 miles; North (left) on CR-26 (Long Run) for 1.1 mile; West (left) onto access road for 0.3 miles back to pad.

AGGREGATION ANALYSIS

New Source Review for major source determinations includes consideration of the aggregation of related sources. A three-pronged test is used to evaluate whether related sources should be aggregated. The three prongs are SIC code, contiguous and adjacent, and common control.

SIC CODE - The facility will operate under SIC code 4922 (Pipeline Transportation of Natural Gas). There are other compressor stations operated by Antero in WV that share the same two-digit major SIC code of 4922. Therefore, the facility shares the same SIC code as other related sources in the region.

CONTIGUOUS OR ADJACENT - The intent of this prong of the test is to assess whether or not other related operations with the same SIC code meet the common sense notion of a single plant. While the terms "contiguous" and "adjacent" are not defined by the U.S. EPA, the dictionary definitions of "contiguous" meaning to be in actual contact and "adjacent" meaning to be nearby and having a common endpoint or border have been used to inform these case-by-case determinations. The closest facility operating under SIC code 4922 is the Mountain Compressor Station located about 6.1 miles to the northwest.

COMMON CONTROL - Common control determinations can require review of contractual arrangements to ascertain the legal relationships between entities with ownership or management control of proposed facilities. The proposed Nichols Compressor Station and the existing Mountain Compress Station will be under Antero's common control.

Based on this review, DAQ concludes that there are no existing or proposed compressor stations that meet all three aggregation criteria relative to the subject facility. While the Nichols Compressor Station is operated by Antero Midstream, LLC under the same two-digit SIC code (4922) as the Mountain Compressor Station, the two facilities are not adjacent or contiguous. Therefore, DAQ concludes that no other facilities should be aggregated with this facility for purposes of air permitting.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emission calculations were calculated by the applicant and reviewed for accuracy by the writer. A discussion of the emission calculations and the potential emissions table follows.

Flare. The flare controls the emissions from the dehydration unit still vent streams at 98% efficiency. The VOC and HAP emissions are based on the ProMax simulation program. The NOX and CO emissions are based on a design heat input of 4.8 MMBtu/hr and AP-42 emission factors from Table 13.5-1 and included a buffer because the flare was not purchased at the time that the application was submitted.

Compressor Engines [CE-01 thru CE-11]. Manufacturer's emission factors were used to calculate the NO_X, CO, VOC, and Formaldehyde emissions. EPA's AP-42 emission factors for RB4S engines were used to calculate SO2, PM10, and total HAP emissions. Calculations were based on an engine rating of 1680 bhp. The non selective catalyst reduction guarantees are: > 99% NO_X, > 98% CO, > 50% VOC, and > 76% HCHO (formaldehyde). The hazardous air pollutants other than formaldehyde are also VOC's and are therefore reduced by 50%.

Microturbines [GEN-1 and GEN-2]. Manufacturer's emission factors were used to calculate NO_X, CO, and VOC emissions. Greenhouse Gas emissions were also provided by the manufacturer. Emission factors are based on natural gas @ 1,000 BTU/scf (HHV). A margin of 20% buffer was added to the emissions to account for richer gas.

Glycol Dehydration Unit Reboilers [RBV-1 and RBV-2]. AP-42, Section 1.4 emission factors were used to calculate the emissions. The burner rating for each reboiler is 1.5 MMBTU/hr and the fuel rate used in the calculations was 0.00133 MMscfh. Dehydrator pass-through emissions to the reboiler are also included. Pass-through emissions were calculated based on 5% of the ProMax fuel stream.

Glycol Dehydration Unit Still Vents [RSV-1 and RSV-2]. The uncontrolled hourly values were calculated using the ProMax simulation program. A control efficiency of 98% was used for the condenser/flare.

Storage Tanks. Working and Breathing losses were calculated using EPA's TANKS 4.09 simulation. Flashing losses from the settling tank were calculated with the ProMax simulation. The combined annual throughput of the produced water tanks [T01 and T02] used in the calculations was 44.7 bbl/day (685,251 gal/yr). The combined annual throughput of the condensate tanks [T04 and T05] used in the calculations was 150.9 bbl/day (2.31 MMgal/yr. The annual combined throughput of the settling tank [T03] used in the calculations is the total throughput from the produced water and the condensate tanks. The miscellaneous storage tanks for oils, TEG, etc. have negligible emissions.

Vapors from storage tanks [T01 - T05] are routed to a vapor recovery unit. The primary VRU is C-13 and the back-up VRU is C-14. The applicant has claimed 98% capture with the VRU system. DAQ follows the guidance provided by TCEQ regarding VRU capture/control. There are additional requirements for claiming over 95% capture/control efficiency that is discussed below. These statements have been reviewed against the process flow diagrams and VRU design specifications by the writer.

- Both VRUs have automatic monitoring, shutdown, and alert systems. These systems are fitted with sensors that detect temperature, pressure, liquid levels,

suction pressure, and motor overload. Should any of the sensors be triggered indicating a shutdown of the VRU, alarms will sound alerting onsite personnel and streams will be directed to the second VRU or the facility inlet.

- VRU C-13 is the primary VRU to collect storage tank vapors and VRU C-14 is the backup VRU in times when the primary VRU is undergoing maintenance or is shutdown. This ensures that the facility's storage tank vapors are continuously captured and controlled. In the unlikely event that both VRU C-13 and C-14 are under maintenance or are shutdown, a bypass system is in place to route tank vapors to the facility inlet; specifically the slug catcher. The VRU system will be designed and constructed to create a closed-loop system where vapors never escape to the atmosphere.

- The compressor of the VRU is equipped to recover both wet and dry gas from the storage tanks. Furthermore, the specification sheet states the unit has a variable frequency drive (VFD) for the compressor motor that is able to adapt the VRU compressor's operating speed as needed for varying pressure and temperature conditions.

Tank Truck Loading [EPLOR]. Condensate and Produced Water loading emissions are based on EPA, AP-42, Section 5.2 (Emissions from loading petroleum liquid), Equation 1. HAP emissions are based on the weight percent HAP from the gas analysis for proportion of VOC estimated emissions. The annual throughput used in the calculations was 55,079 bbl/yr of condensate and 16, 316 bbl/yr of produced water. The tank truck loading emissions are not routed to a control device; therefore, the controlled and uncontrolled potential emissions are the same.

Fugitive Emissions.
Compressor blowdown emissions are based on 24 blowdowns per year per engine. Emissions from 2 station emergency shutdowns per year are included. Pigging blowdown emissions are based on 52 events per year. HAP emissions are based on the weight percent HAP from the gas analysis for proportion of VOC estimated emissions.

Emission factors for leaks are taken from EPA 1995 Protocol for Equipment Leak Emission Estimates, Table 2-4, Oil and Gas Production Operations Average Emission Factors. The total HAP emissions are based on wt % of HAP from gas analysis applied to the proportion of VOC estimated. The gas service count used for the VOC leak emissions are 2500 flanges and 1000 valves.

Greenhouse Gases. Global Warming Potentials were obtained from 40 CFR 98, Subpart A, Table A-1. Combustion emission factors are from 40 CFR 98, Subpart C, Tables C-1 and C-2. The CO2 and CH4 emissions from engines CE-1 thru CE-11 were provided in the manufacturer data sheets. The microturbine GHG emissions were provided by the manufacturer. Equipment leaks, fugitive emissions, tank emissions and tank truck loading emissions were calculated using the the representative gas analysis. The dehydration emissions came from the ProMax simulation. The total estimated facility GHG emissions are 99,269 tpy of CO_2e.

Emissions Summary Table:

Emission Point ID	Emission Unit ID	Control Device ID	Regulated Pollutant	Maximum Potential Uncontrolled Emissions		Maximum Potential Controlled Emissions	
				lb/hr	tpy	lb/hr	tpy
1E	C-01 (Pilot Flame Only)	None	NO_X	n/a	n/a	0.33	1.43
			CO	n/a	n/a	1.78	7.78
15E thru 25E	CE-01 thru CE-11 (Total)	C-02 thru C-12 (NSCR Catalyst)	NO_X	554.07	2426.9	5.72	24.98
			CO	521.5	2284.1	10.56	46.40
			VOC	16.3	71.4	9.35	41.04
			SO_2	0.09	0.39	0.09	0.39
			PM_{10}	1.43	6.38	1.43	6.38
			Acetaldehyde	0.43	1.87	0.22	0.94
			Acrolein	0.40	1.77	0.20	0.89
			Benzene	0.24	1.06	0.12	0.53
			Methanol	0.47	2.05	0.24	1.03
			Formaldehyde	2.09	8.92	0.44	1.78
			Total HAPs	3.92	16.92	2.27	9.78
26E, 27E	GEN-1, GEN-2 (Total)	None	NO_X	0.20	0.84	0.20	0.84
			CO	0.52	2.30	0.52	2.30
			VOC	0.04	0.20	0.04	0.20
28E, 30E	RBV-1, RBV-2 (Total)	None	NO_X	0.26	1.16	0.26	1.16
			CO	0.22	0.98	0.22	0.98
			VOC	2.26	9.88	2.26	9.88
			SO_2	0.00	0.00	0.00	0.00
			PM_{10}	0.02	0.09	0.02	0.09
			Formaldehyde	<0.01	<0.01	<0.01	<0.01
			Total HAPs	0.10	0.44	0.10	0.44
29E, 31E	RSV-1 , RSV-2 (Total)	C-01 (Flare)	VOC	95.38	417.74	1.91	8.35
			Benzene	2.56	11.19	0.05	0.22
			Total HAP	17.18	75.28	0.34	1.51

32E, 33E	T01, T02 (Total)	C-13 / C-14 (VRU)	VOC	0.54	2.35	0.01	0.05
			HAP	n/a	n/a	n/a	n/a
34E	T03	C-13 / C-14 (VRU)	VOC	91.40	400.33	1.83	8.01
			HAP	7.16	31.38	0.14	0.63
35E, 36E	T04, T05 (Total)	C-13 / C-14 (VRU)	VOC	2.41	10.58	0.05	0.21
			HAP	n/a	n/a	n/a	n/a
37E	EPLOR	None	VOC	2.14	9.36	2.14	9.36
			HAP	0.01	0.01	0.01	0.01
NA	FUGITIVE	None	VOC	4.34	19.01	4.34	19.01
			HAP	0.01	0.02	0.01	0.02

Fugitive Emissions

Fugitive Emissions Description	**Regulated Pollutant**	**Maximum Potential Uncontrolled Emissions**	
		lb/hr	**tpy**
Equipment Leaks	VOC	2.39	10.48
	Methane	7.19	31.51
	HAPs	0.01	0.01
Other - Vented	VOC	1.95	8.54
	Methane	7.66	33.53
	HAPs	<0.01	<0.01

Total Facility Emissions Table:

Regulated Pollutant	**Maximum Potential Controlled Emissions Without Fugitives**		**Maximum Potential Controlled Emissions With Fugitives**	
	lb/hr	**tpy**	**lb/hr**	**tpy**
NO_X	6.51	28.41	6.51	28.41
CO	13.08	57.46	13.08	57.46
SO_2	0.09	0.39	0.09	0.39
PM_{10}	1.45	6.47	1.45	6.47
VOC	17.59	77.10	21.93	96.11

Formaldehyde	0.42	1.79	0.42	1.79
Acetaldehyde	0.22	0.94	0.22	0.94
Acrolein	0.20	0.89	0.20	0.89
Benzene	0.17	0.75	0.17	0.75
Methanol	0.24	1.03	0.24	1.03
Total HAPs	2.86	12.37	2.87	12.39

REGULATORY APPLICABILITY

***Applicable State Regulations*.** The following regulations apply to this facility.

45CSR2 TO PREVENT AND CONTROL PARTICULATE AIR POLLUTION FROM COMBUSTION OF FUEL IN INDIRECT HEAT EXCHANGERS

The applicant is not subject to the weight emission standard for particulate matter set forth in 45 CSR2-4.1 because the reboiler is less than 10 MMBtu/hr; however, they are subject to the 10% opacity based on a six minute block average. Compliance will be demonstrated by complying with permit requirements. The applicant is using natural gas as fuel; therefore, meeting the 10% opacity requirements should not be a problem.

45CSR6 TO PREVENT AND CONTROL AIR POLLUTION FROM THE COMBUSTION OF REFUSE

The applicant has one flare at the facility that is subject to this rule. The flare will use natural gas as its fuel and therefore will have negligible particulate matter emissions and is expected to be in compliance by being in compliance with the permit requirements.

45CSR10 TO PREVENT AND CONTROL AIR POLLUTION FROM THE EMISSION OF SULFUR OXIDES

The glycol dehydration reboilers each have a maximum design heat input of less than 10 MMBtu/hr and are therefore exempt from sections 3, 6, and 8.

45CSR13 PERMITS FOR CONSTRUCTION, MODIFICATION, RELOCATION AND OPERATION OF STATIONARY SOURCES OF AIR POLLUTANTS, NOTIFICATION REQUIREMENTS, ADMINISTRATIVE UPDATES, TEMPORARY PERMITS, GENERAL PERMITS, PERMISSION TO COMMENCE CONSTRUCTION, AND PROCEDURES FOR EVALUATION

The applicant is subject to this rule because they meet the definition of a stationary source.

They have demonstrated compliance with 45CSR13 by submitting a complete permit application, placing a legal advertisement in *The Herald Record* on July 22, 2014, and

paying the applicable fees.

45CSR16 STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES PURSUANT TO 40 CFR PART 60

The facility is subject to 45CSR16 because they are subject to NSPS, Subparts JJJJ and OOOO.

45CSR22 AIR QUALITY MANAGEMENT FEE PROGRAM

The applicant has paid the $1,000 application fee, the $1,000 NSPS fee and the $2,500 NESHAP fee as required by section 3.4.b of this rule because they are subject to both NSPS and NESHAP requirements as described in this regulatory review section.

Additionally, the source will be added to the fee database when the registration is issued and the facility will be required to maintain their certificate to operate.

45CSR34 EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

The facility is subject to 45CSR34 because they are subject to 40 CFR 63, Subparts HH and ZZZZ.

***Applicable Federal Regulations*.** The following regulations apply to this facility.

40CFR60, SUBPART, JJJJ STANDARDS OF PERFORMANCE FOR NEW STATIONARY SPARK IGNITION INTERNAL COMBUSTION ENGINES

Subpart JJJJ establishes emission standards for applicable SI ICE.

The 1,680 hp Waukesha L7044GSI compressor engines [CE-1 thru CE-11] 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 L7044GSI compressor engines [CE-1 thru CE-11] 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). The emission limits will be met by way of five-element EMIT non-selective catalysts that were purchased separately from the engines. Based on the manufacturer's specifications for these engines, the emission standards will be met.

The proposed 1,680 hp Waukesha L7044GSI compressor engines [CE-1 thru CE-11] will not be certified according to NSPS, 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 its new source performance standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 2012. EPA published final amendments to the subpart on September 23, 2013.

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 affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this subpart as described below:

a. 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.

b. Each centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals that is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment.

   There are no centrifugal compressors at this facility. Therefore, all requirements regarding centrifugal compressors affected facilities under 40 CFR 60, Subpart OOOO would not apply.

c. Each reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment.

   There are reciprocating internal combustion engines located at this facility that were constructed after August 23, 2011. Therefore, the requirements regarding reciprocating compressors under 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.*

d. For the natural gas production segment (between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not including natural gas processing plants), 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.

The pneumatic controllers installed at Nichols Compressor Station will be air-actuated. Therefore, there are no applicable pneumatic controllers which constructed construction after August 23, 2011 and the requirements for pneumatic controllers under Subpart OOOO do not apply.

e. Each storage vessel affected facility, which is a single storage vessel located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment.

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 days 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 Nichols Compressor Station will be controlled by a Vapor Recovery Unit (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 an efficiency of 98% for the VRU system.

In order to claim an efficiency greater than 95%, Antero is required to meet additional design/function requirements. Antero will be required to perform three 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*

The review of these requirements is further discussed in the emissions section of this evaluation.

f. The group of all equipment, except compressors, within a process unit is an affected facility.

The Nichols Compressor Station is not a natural gas processing plant. Therefore, Leak Detection and Repair (LDAR) requirements for onshore natural gas processing plants does not apply.

g. Sweetening units located at onshore natural gas processing plants that process natural gas produced from either onshore or offshore wells.

There are no sweetening units at Nichols Compressor Station. Therefore, none of the requirements regarding sweetening units under Subpart OOOO apply.

40 CFR63, SUBPART HH NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS FROM OIL AND NATURAL GAS PRODUCTION FACILITIES

Subpart HH establishes national emission limitations and operating limitations of HAPs emitted from oil and natural gas production facilities located at major and area sources of HAP emissions. For area source applicability, the affected source includes each triethylene glycol (TEG) dehydration unit located at a facility that meets the criteria specified in §63.760(a).

The two glycol dehydration units [RSV-1 and RSV-2] are TEG dehydration units located at an area source of HAPs and thus are subject to this subpart. Because the potential benzene emissions are less than 1 tpy, the units are only subject to the recordkeeping requirements that demonstrate exemption from the control requirements of this rule.

Based on the PTE emissions, the applicant will be in compliance with the benzene exception from § 63.764(d) and further compliance will be demonstrated by

demonstrating compliance with the recordkeeping requirements provided in the permit.

40 CFR63, SUBPART ZZZZ NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR STATIONARY RECIPROCATING INTERNAL COMBUSTION ENGINES

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

The engines [CE-01 thru CE-11] at the Nichols Compressor Station are subject to the area source requirements for non-emergency spark ignition engines. Compliance will be demonstrated by complying with NSPS, Subpart JJJJ. These requirements were outlined above along with the compliance discussion.

***Non-applicability determinations*.** It has been determined that the applicant is not subject to the following rules:

45CSR14 PERMITS FOR CONSTRUCTION AND MAJOR MODIFICATION OF MAJOR STATIONARY SOURCES OF AIR POLLUTANTS

The Nichols Compressor Station is located in Dodridge County, which is in an attainment county for all criteria pollutants. The applicant is not subject to this rule because they do not meet the definition of a major stationary source because the facility PTE (as shown in the emissions section of this evaluation) for the criteria pollutants are all below the PSD threshold of 250 tpy.

On June 23, 2014, the United States Supreme Court issued a decision addressing the application of stationary source permitting requirements to greenhouse gases. In very brief summary, the Supreme Court said that EPA may not treat greenhouse gases as an air pollutant for the purposes of determining whether a source is a major stationary source.

45CSR30 REQUIREMENTS FOR OPERATING PERMITS

The applicant is not subject to this rule because they do not meet the definition of a major source. The applicant is subject to 40 CFR 60, Subpart JJJJ and OOOO and 40 CFR 63, Subpart HH and ZZZZ, however they are exempt from the obligation to obtain a permit under 40 CFR, Part 70 or 71 provided that 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 VOLATILE ORGANIC LIQUID STORAGE VESSELS (INCLUDING PETROLEUM LIQUID STORAGE VESSELS) FOR WHICH CONSTRUCTION, RECONSTRUCTION, OR

MODIFICATION COMMENCED AFTER JULY 23, 1984

Subpart Kb establishes control requirements, testing requirements, monitoring requirements, and recordkeeping and reporting requirements.
Subpart Kb applies to any storage vessel with a capacity greater than 19,313 gallons that is used to store volatile organic liquids except that it does not apply to storage vessels with a capacity greater than 39,890 gallons storing a liquid with a maximum true vapor pressure less than 3.5 kPa or with a capacity greater than 19,813 gallons but less than 39,890 gallons storing a liquid with a maximum true vapor pressure less than 15.0 kPa.

This subpart does not apply to vessels with a design capacity less than or equal to 419,204 gallons used for petroleum or condensate stored, processed, or treated prior to custody transfer.

40 CFR 60, SUBPART GG STANDARDS OF PERFORMANCE FOR STATIONARY GAS TURBINES

Subpart GG applies to stationary gas turbines with a heat input at peak load equal to or greater than 10 MMBtu/hr, based on the lower heating value of the fuel fired per § 60.330(a). The two Capstone C200 micro turbines will have a heat input rating less than 10 MMBtu/hr; therefore this subpart does not apply.

40 CFR 60, SUBPART KKK STANDARDS OF PERFORMANCE FOR EQUIPMENT LEAKS OF VOC FROM ONSHORE NATURAL GAS PROCESSING PLANTS

Subpart KKK applies to onshore natural gas processing plants that commenced construction after January 20, 1984, and on or before August 23, 2011. The Nichols Compressor Station is not a natural gas processing facility and therefore is not subject to this rule.

40 CFR 60, SUBPART KKKK STANDARDS OF PERFORMANCE FOR STATIONARY COMBUSTION TURBINES

This subpart establishes emission standards and compliance schedules for the control of emissions from stationary combustion turbines that commenced construction, modification or reconstruction after February 18, 2005.

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 values of the fuel per § 60.4305.

<u>TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS</u>

The Nichols 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.

AIR QUALITY IMPACT ANALYSIS

Modeling was not required for this source due to the fact that the facility is not considered a “major source” according to 45CSR 14 or 45CSR19.

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 40 CFR 60, Subparts JJJJ and OOOO.
- Monitor the wet natural gas throughput of each dehydration unit.
- 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 requirement 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 a record of the actual average annual benzene emissions from the glycol dehydration unit per 40 CFR 63, Subpart HH.
- Maintain records of all applicable requirements of 40 CFR 60, 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.

CHANGES TO PERMIT

This is a new construction permit.

RECOMMENDATION TO DIRECTOR

It is recommended that permit R13-3201 be granted to Antero Midstream LLC; Nichols Compressor Station located in Pennsboro, Doddridge County. Based on the information provided in the application, including all supplemental information received, the applicant should be in compliance with all applicable state and federal air regulations.

Laura M. Jennings
Permit Engineer

Date