



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: G70-A173
Plant ID No.: 069-00113
Applicant: SWN Production Company, LLC (SWN)
Facility Name: Alice Edge Pad
Location: Valley Grove, Ohio County, West Virginia
NAICS Code: 211111
Application Type: Modification
Received Date: August 7, 2015
Engineer Assigned: David Keatley
Fee Amount: \$1,500
Date Fee Received: August 7, 2015
Complete Date: October 22, 2105
Due Date: December 6, 2015
Applicant Ad Date: August 6, 2015
Newspaper: *The Intelligencer*
UTM's: Easting: 537.447 km Northing: 4,438.933 km Zone: 17T
Description: Installation and operation of: eleven (11) 1.0-mmBtu/hr GPUs, five (5) 0.5-mmBtu/hr heater treaters, two (2) 1.5-mmBtu/hr line heaters, three (3) 1.5 mmBtu/hr stabilizer heaters, eight (8) additional 400-bbl condensate tanks, two (2) 145-bhp engines, one (1) 622-bhp engine, one (1) 567-bhp engine, and one (1) 30-mmBtu/hr combustor. This application also seeks to remove of one (1) 23.6-bhp engine and one (1) 145-bhp engine.

DESCRIPTION OF PROCESS

The facility is an oil and natural gas exploration and production facility which produces natural gas and condensate. Condensate, gas, and water come from the five (5) natural gas wells to the GPUs (gas production units), where the first stage of separation occurs. Liquids (condensate and produced water) from the eleven (11) 1.0-mmBtu/hr GPUs will be sent to the heater treaters. The natural gas from the GPUs will exit the facility via the sales gas pipeline. The five (5) 0.5-mmBtu/hr heater treaters are used to treat emulsions, which are stable mixtures of condensate, solids, and water. These units use thermal, gravitational, mechanical, and

sometimes chemical methods to break the emulsions and separate the condensate from water. Elevating the emulsion temperature is particularly effective in lowering condensate viscosity and promoting phase separation. The process causes hydrocarbons, including methane, to vaporize and escape. The flash from the heater treaters is captured via the flash gas compressors driven by natural gas fired engines then exit the facility via the sales gas pipeline. Produced water from the heater treaters flows into four (4) 400-bbl produced water tanks and will be trucked offsite at maximum rate of 12,264,000 gallons/year. Condensate from the heater treaters flows to the stabilizers. The stabilizers are heated by three (3) 1.5-mmBtu/hr stabilizer heaters. The vapors from the stabilizers are sent to the flash gas compressors to increase the pressure of the vapors and will then exit the facility via the sales gas pipeline. The flash gas compressors are powered by the following natural gas fired four-stroke engines: two (2) 145-bhp Caterpillar G3306 NA rich-burn equipped with a NSCR catalyst, one (1) 622-bhp Caterpillar G3508 TALE AFR lean-burn, and one (1) 567-bhp Caterpillar G3508 TALE lean-burn. The condensate from the stabilizers flows to twelve (12) 400-bbl condensate tanks (eight (8) additional tanks) and will be trucked offsite at a maximum rate of 68,985,000 gallons/year. Condensate and produced water are transported off site via truck. Loading emissions will be controlled with vapor return, which has at least 70% capture efficiency, routed to the vapor combustor for at least 98% destruction efficiency. Working, breathing and flashing vapors from the 400 bbl condensate storage tanks and 400 bbl produced water tanks will be routed to a 30 mmBtu/hr MRW vapor combustors with 98% destruction efficiency. The vapor combustors have natural gas fired pilots to ensure a constant flame for combustion. In the original application SWN wanted to allow two VRU engines, but agreed in a meeting on 10/22/2015 that neither would be permitted.

SITE INSPECTION

A site inspection was conducted by Steve Sobutka of the Northern Panhandle Regional Office on May 13, 2013. The facility was deemed in compliance.

From Interstate 70 east of Wheeling, WV, take Exit 5 and travel east on US RT 40. Continue straight on US RT 40 for approximately 6.8 miles to well pad entrance on the left, immediately after the bridge.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this application consist of the combustion emissions from the new compressor engines (EU-ENG5, EU-ENG6, EU-MC1498, EU-MC2322, EU-ENG3, and EU-ENG4), new GPU burners (EU-GPU1 through EU-GPU11), new heater treaters (EU-HT1 through EU-HT5), new stabilization heaters (EU-SH1 through EU-SH3), and changes in the process that affect the condensate tanks (EU-TANKS-COND) and produced water tanks (EU-TANKS-PW), condensate truck loading (EU-LOAD-COND), and produced water truck loading (EU-LOAD-PW).

Table 1: Calculation Methodology

Emission Unit ID#	Process Equipment	Calculation Methodology*
EU-ENG5 and EU-ENG6	Caterpillar G3306 NA	NOx and CO catalyst manufacturer, VOC and HCHO engine manufacturer, other pollutants AP-42
EU-MC1498	Caterpillar G3508 TALE AFR	NOx, CO, VOC, and HCHO engine manufacture, Other pollutants AP-42
EU-MC2322	Caterpillar G3508 TALE	NOx, CO, VOC, and HCHO engine manufacture, Other pollutants AP-42
EU-GPU1 through EU-GPU11	Gas Production Units	EPA AP-42 Emission Factors
EU-HT1 through EU-HT5	Heater Treaters	EPA AP-42 Emission Factors
EU-SH1 through EU-SH3	Stabilization Heaters	EPA AP-42 Emission Factors
EU-TANKS-COND	Twelve (12) 400-bbl Condensate Tanks	EPA Tanks 4.0.9d, Promax 3.2
EU-TANKS-PW	Four (4) 400-bbl Produced Water Tanks	EPA Tanks 4.0.9d, Promax 3.2
EU-LOAD-COND	Condensate Truck Loading	EPA AP-42 Emission Factors
EU-LOAD-PW	Produced Water Truck Loading	EPA AP-42 Emission Factors
APC-COMB-TKLD	One (1) 30.0-MMBTU/hr Vapor Combustor	EPA AP-42 Emission Factors

*CO₂ Equivalent was estimate using 40CFR98

Fugitive emissions for the facility are based on calculation methodologies presented in the 2009 American Petroleum Institute Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry. The factors presented in the API Compendium are for methane emissions. Therefore, the fugitive VOC and HAP emissions were calculated using a representative gas analysis and the weight percent of each respective pollutant.

Table 2: Estimated Summarized Maximum PTE

Emission Unit ID	Emission Point ID	Process Unit	Pollutant	Maximum Controlled Emission Rate	
				Hourly (lb/hr)	Annual (ton/year)
EU-ENG5	EP-ENG5	Caterpillar G3306 NA Engine	Nitrogen Oxides	0.32	1.40
			Carbon Monoxide	0.64	2.80
			Sulfur Dioxide	0.01	0.04
			Particulate Matter-10	0.02	0.09
			Volatile Organic Compounds	0.24	1.05
			Formaldehyde	0.02	0.09
			Carbon Dioxide Equivalent	155.19	679.73
EU-ENG6	EP-ENG6	Caterpillar G3306 NA Engine	Nitrogen Oxides	0.32	1.40
			Carbon Monoxide	0.64	2.80
			Sulfur Dioxide	0.01	0.04
			Particulate Matter-10	0.02	0.09
			Volatile Organic Compounds	0.24	1.05
			Formaldehyde	0.02	0.09
			Carbon Dioxide Equivalent	155.19	679.73
EU-MC1498	EP-MC1498	Caterpillar G3508 TALE AFR Engine	Nitrogen Oxides	2.74	12.00
			Carbon Monoxide	3.51	15.37
			Sulfur Dioxide	0.01	0.04
			Particulate Matter-10	0.05	0.22
			Volatile Organic Compounds	1.10	4.82
			Formaldehyde	0.23	1.02
			Carbon Dioxide Equivalent	731.54	3,204
EU-MC2322	EP-MC2322	Caterpillar G3508 TALE	Nitrogen Oxides	2.50	10.95
			Carbon Monoxide	3.16	13.84
			Sulfur Dioxide	0.01	0.04
			Particulate Matter-10	0.05	0.22
			Volatile Organic Compounds	1.03	4.51

		Engine	Formaldehyde	0.40	1.75
			Carbon Dioxide Equivalent	762	3,337
EU-GPU1 Through EU-GPU11	EP-GPU1 Through EU-GPU11	Gas Production Units (Total Emissions)	Nitrogen Oxides	1.21	5.28
			Carbon Monoxide	0.99	4.29
			Sulfur Dioxide	0.01	0.03
			Particulate Matter-10	0.09	0.40
			Volatile Organic Compounds	0.07	0.33
			Carbon Dioxide Equivalent	1,288	5,642
EU-HT1 Through EU-HT5	EP-HT1 Through EU-HT5	Heater Treaters (Total Emissions)	Nitrogen Oxides	0.30	1.30
			Carbon Monoxide	0.25	1.10
			Sulfur Dioxide	<0.01	0.01
			Particulate Matter-10	0.02	0.09
			Volatile Organic Compounds	0.02	0.05
			Carbon Dioxide Equivalent	293	1,283
EU-SH1 Through EU-SH3	EP-SH1 Through EU-SH3	Stabilizer Heaters (Total Emissions)	Nitrogen Oxides	0.51	2.22
			Carbon Monoxide	0.42	1.83
			Sulfur Dioxide	<0.01	0.01
			Particulate Matter-10	0.04	0.17
			Volatile Organic Compounds	0.03	0.12
			Carbon Dioxide Equivalent	527	2,308
EU-LOAD- COND	EP-LOAD- COND	Condensate Truck Loading	Volatile Organic Compounds	8.41	36.84
			Total HAPs	0.68	2.98
			Carbon Dioxide Equivalent	3	11
EU-LOAD- PW	EP-LOAD- PW	Produced Water Truck Loading	Volatile Organic Compounds	0.03	0.13
			Total HAPs	<0.01	0.01
			Carbon Dioxide Equivalent	6	23
APC- COMB-	APC- COMB-	MRW Vapor	Nitrogen Oxides	4.14	18.13
			Carbon Monoxide	8.27	36.22
			Particulate Matter	0.09	0.39
			Volatile Organic Compounds	3.19	13.97
			n-Hexane	0.18	0.79

TKLD	TKLD	Combustor	Benzene	<0.01	0.01
			Toluene	0.01	0.05
			Ethylbenzene	0.01	0.06
			Xylenes	0.05	0.22
			Carbon Dioxide Equivalent	3,513	15,387
EU-PILOT	EP-PILOT	Vapor Combustor Pilot	Nitrogen Oxides	0.02	0.09
			Carbon Monoxide	0.01	0.06
			Particulate Matter	<0.01	<0.01
			Volatile Organic Compounds	<0.01	<0.01
			Sulfur Dioxide	<0.01	<0.01
			Carbon Dioxide Equivalent	16	70
EU-FUG	EP-FUG	Fugitive Emissions	Volatile Organic Compounds	2.04	8.95
			Total HAPs	0.13	0.55
			Carbon Dioxide Equivalent	40	175

Table 3: Total Facility-Wide PTE

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	52.78
Carbon Monoxide	78.31
Volatile Organic Compounds	72.06
Sulfur Dioxide	0.19
Total Particulate Matter	29.48
Acetaldehyde	0.43
Acrolein	0.28
Benzene	0.09
Ethylbenzene	0.24
Formaldehyde	2.95
Methanol	0.18
n-Hexane	3.49
Toluene	0.25
Xylenes	0.85
Total HAPs	8.76
Carbon Dioxide Equivalent	32,797

Table 4: Control Efficiencies

Emission Unit	Pollutant	Control Device	Control Efficiency
EU-ENG5 and EU-ENG6 Compressor Engines	Nitrogen Oxides	NSCR Catalyst	92.58%
	Carbon Monoxide		85.15%
	Formaldehyde		76%
EU-TANKS-COND, EU-TANKS-PW Storage Tanks	Volatile Organic Compounds	APC-COMB-TKLD	98.00 %
	Total HAPs		98.00 %
EU-LOAD-COND, EU-LOAD-PW Loadout Racks	Volatile Organic Compounds	Vapor Return/ APC-COMB-TKLD	70.00 %

REGULATORY APPLICABILITY

The following rules and regulations apply to the changes at the facility:

45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers)

- The purpose of 45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) is to establish emission limitations for smoke and particulate matter which are discharged from fuel burning units.

45CSR2 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

The individual heat input of all of the proposed fuel burning units (EU-GPU1 through EU-GPU11, EU-HT1 through EU-HT5, and EU-SH1 through EU-SH3) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR2. However this facility would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

45CSR4 (To Prevent and Control the Discharge of Air Pollutants into the Open Air which Causes or Contributes to an Objectionable Odor or Odors)

This facility shall not cause the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public. 45CSR4 states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly authorized representative of the Air Pollution Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable.

45CSR6 (To Prevent and Control Air Pollution from the Combustion of Refuse)

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

Antero has one (1) 30 mmBtu/hr MRW vapor combustor at this facility. The vapor combustor is subject to section 4, emission standards for incinerators. The vapor combustor has a maximum capacity of 187 lb/hr and an allowable emission rate of 0.51 pounds of particulate matter per hour. The vapor combustor has an hourly particulate matter emissions rate which is negligible as can be seen in Table 2. Therefore, the facility's vapor combustor should demonstrate compliance with this section. The facility will demonstrate compliance by maintaining records of the amount of natural gas consumed by the vapor combustor and the hours of operation. The facility will also monitor the flame of the vapor combustor and record any malfunctions that may cause no flame to be present during operation.

45CSR10 (To Prevent and Control Air Pollution from the Emissions of Sulfur Oxides)

45CSR10 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 3 (weight emission standard), 6 (registration), 7 (permits), and 8 (testing, monitoring, recordkeeping, reporting). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

The individual heat input of all of the proposed fuel burning units (EU-GPU1 through EU-GPU11, EU-HT1 through EU-HT5, and EU-SH1 through EU-SH3) 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 the changes proposed under this permitting action results in an emissions increase above permitting thresholds. However, since the proposed changes at the facility result in increased emissions less than 6 lb/hr and 10 tons/year CHK is required to submit an application for a Class II Administrative Update. CHK has published the required Class I legal advertisement notifying the public of their permit application, and paid the appropriate application fee (administrative update & NSPS).

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40CFR60)

45CSR16 incorporates by reference the standards of performance for new stationary sources (40CFR60). This facility is subject to 40CFR60 subpart OOOO and 40CFR60 subpart JJJJ and therefore this facility is subject to 45CSR16.

45CSR22 (Air Quality Management Fee Program)

This facility is a minor source as can be seen in Table 3 and not subject to 45CSR30 since the regulations this facility is subject to are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71. This facility has a maximum horsepower capacity greater than 1,000 hp (1,479 hp) and is an 8D source and is required to pay a \$500 annual fee. SWN is required to keep their Certificate to Operate current.

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

40CFR60 Subpart JJJJ sets forth emission limits, fuel requirements, installation requirements, and monitoring requirements based on the date of construction, date of manufacture, and horsepower (hp) of the spark ignition internal combustion engine. All proposed engines will commence construction after June 12, 2006.

Engine EU-MC1498 is a SI RICE lean-burn engine which is greater than 500 hp and was manufactured after January 1, 2008 (February 25, 2010) and is subject to this subpart. The allowable emission standards for engines EU-ENG5 and EU-ENG6 in g/hp-hr are: NO_x, 2.0; CO, 4.0; and VOC, 1.0. The estimated emissions were estimated in g/hp-hr with: NO_x, 2.0; CO, 2.56; and VOC, 0.8, which are below the allowable standards. These engines will also have operating limits, performance tests, notification requirements, and recordkeeping requirements.

Engine EU-MC2322 is a SI RICE lean-burn engine which is greater than 500 hp and was manufactured before January 1, 2008 (January 24, 2007) and has no requirements due to this regulation.

Engines EU-ENG5 and EU-ENG6 are subject to this subpart due to the engines being non-emergency SI natural gas fired have a hp greater than 100 hp and less than 500 hp (145 bhp) and assuming an engine manufacturer's data of January 1, 2011 or newer. The allowable emission standards for engines EU-ENG5 and EU-ENG6 in g/hp-hr are: NO_x, 1.0; CO, 2.0; and VOC, 0.7. The estimated emissions were estimated in g/hp-hr with: NO_x, 1.0; CO, 2.0; and VOC, 0.7, which are below the allowable standards. These engines will also have operating limits, performance tests, notification requirements, and recordkeeping requirements.

40CFR60 Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution)

EPA issued its new source performance standards (NSPS) and air toxics rules for the oil and gas sector on April 17, 2012. 40CFR60 Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO₂) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The following affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this subpart:

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

The eleven (11) natural gas wells at the Alice Edge Pad were drilled principally for the production of natural gas and were done so after August 23, 2011. Therefore, these wells would be considered affected facilities under this subpart. The compliance date for these hydraulically fractured wells is October 15, 2012 or upon startup whichever is later. Antero is required under §60.5410 to submit an initial notification, initial annual report, maintain a log of records for each well completion, and maintain records of location and method of compliance. §60.5420 requires SWN demonstrate continuous compliance by submitting reports and maintaining records for each completion operation.

- 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.

SWN is proposing adding reciprocating internal combustion engines to be located at the Alice Edge Pad. These engines will be delivered after the effective date of this rule. However, this regulation specifically states that any reciprocating compressor located at a well site is not an affected facility under this subpart. Therefore, this section of this regulation would not apply.

- c. 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.

2. 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.

No pneumatic controllers greater than 6 scfh will be installed at this facility.

- 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 nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provides structural support and is designed to contain an accumulation of liquids or other materials. The following are not considered storage vessels:

1. 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.
2. Process vessels such as surge control vessels, bottoms receivers or knockout vessels.
3. 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 produced water tanks would emit less than 6 tpy of VOCs uncontrolled and are therefore not subject to this section of this regulation. The condensate tanks located at the Alice Edge Pad would emit more than 6 tpy of VOC per each tank (50.74 tpy). However, SWN has proposed to install a vapor combustor to capture the VOC emissions with a 98% control efficiency (which is greater than 95%) and is therefore not subject to this section of this regulation.

40CFR63 Subpart ZZZZ (National Emissions 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 facility is a minor source of hazardous air pollutants (HAPS < 10 tpy of an individual HAP and < 25 tpy of aggregate HAPs) as can be seen in Table 2. The facility is therefore considered an area source (§63.6585(c)). The engine is considered new stationary RICE (§63.6590(a)(2)(iii)) due to the installation date of the engine (ENG001) being after June 12, 2006.

Stationary RICE subject to Regulations under 40 CFR Part 60 must meet the requirements of those subparts that apply (40 CFR 60 Subpart JJJJ, for spark ignition engines) if the engine is a new stationary RICE located at an area source (§63.6590(c)(1)). No additional requirements apply for this engine under this subpart.

The following rules and regulations do not apply to the facility:

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

40CFR60 Subpart A §60.18 contains requirements for control devices when they are used to comply with applicable subparts of 40CFR60 and 40CFR61. The vapor combustor that Antero has proposed is not used to comply with one of these regulations. The purpose of the vapor combustor is to control emissions from the tanks that are routed to it. However, these tanks are not subject to 40CFR60 Subpart Kb due to their size. In addition 40CFR60.18 refers to flares but makes no mention of enclosed combustion devices. Therefore, Antero is not subject to this regulation.

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

40CFR60 Subpart Kb does not apply to storage vessels with a capacity less than 75 cubic meters. The tanks that Antero has proposed to install are 63.60 cubic meters each. Therefore, SWN's tanks would not be subject to this regulation

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. Antero included the following HAPs as emitted in substantive amounts (at least 20 pounds (0.01 tons) per year) in their emissions estimate: Benzene, n-Hexane, Toluene, and Xylenes. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 3: Potential HAPs - Carcinogenic Risk

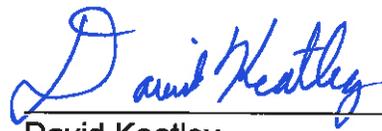
HAPs	Type	Known/Suspected Carcinogen	Classification
n-Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Ethylbenzene	VOC	No	Inadequate Data
Xylenes	VOC	No	Inadequate Data

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*. This facility is a minor source of HAPs as can be seen in Table 2. For

a complete discussion of the known health effects of each compound refer to the IRIS database located at www.epa.gov/iris.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates compliance with all state and federal air quality requirements will be satisfied and this facility is expected to meet the requirements of General Permit G70-A. Therefore SWN's request to Modify and operate its Alice Edge Pad natural gas production facility is recommended to the Director of Air Quality.



David Keatley
Permit Writer - NSR Permitting

October 22, 2015

Date