



west virginia department of environmental protection

Division of Air Quality
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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3103
Plant ID No.: 103-00070
Applicant: HG Energy, LLC
Facility Name: Blacksnake
Location: near Wileyville, Wetzel County
NAICS Code: 211111
Application Type: Construction
Received Date: July 9, 2013
Engineer Assigned: David Keatley
Fee Amount: \$4,500
Date Received: July 16, 2013
Complete Date: November 26, 2013
Due Date: February 24, 2013
Applicant Ad Date: July 17, 2013
Newspaper: *Wetzel Chronicle*
UTM's: Easting: 529.740 km Northing: 4,383.542 km Zone: 17
Description: After-the-fact installation of three compressor engines.

DESCRIPTION OF PROCESS

Blacksnake is a natural gas compression facility which increases the pressure of the natural gas stream from approximately 5 psig to approximately 450 psig. Natural gas will enter the facility via pipeline and will be sent to one of three compressor. Each compressor will be powered by a compressor engine. Engine 1S is a 203 bhp Caterpillar G3306 TA HCR (DOM August 26, 2006) four-stroke rich-burn engine equipped with a Miratech NSCR catalyst. Engine 2S is a 215 bhp Caterpillar G3406NA (DOM June 26, 2006) four-stroke rich-burn engine equipped with a NSCR Miratech catalyst. Engine 3S is a 215 bhp Caterpillar G3406NA (DOM October 10, 2008) four-stroke rich-burn engines equipped with a Miratech NSCR catalyst.

SITE INSPECTION

Douglas Hammell from DAQ's Compliance and Enforcement Section performed a site visit on November 6, 2013. The closest residence is approximately 1,100 feet away. The site seems appropriate for the after-the-fact facility.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

For the Caterpillar Engines emission factors are from the catalyst manufacturer (CM), the engine manufacturer (EM), and AP-42. Emission factors from the EM in g/bhp-hr are: 0.5 for NO_x. Emissions factors for the CM in g/bhp-hr are: CO, 0.19; VOC, 0.32; and Formaldehyde, 0.04. The emission factors from AP-42 in lb/MMBTU are: PM, 0.00999 ; and SO₂, 0.000588.

The following table lists the estimated controlled air emissions:

Source ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
1S	Compressor Engine Caterpillar G3306 TA HCR 203 bhp	NO _x	0.85	3.72
		Carbon Monoxide	0.85	3.72
		VOC	0.06	0.26
		PM	0.04	0.16
		PM ₁₀	0.04	0.16
		Benzene	<0.01	0.01
		Formaldehyde	0.09	0.39
		Acetaldehyde	0.01	0.02
		Acrolein	<0.01	0.02
		Methanol	0.01	0.02
		CO _e	211.58	926.74
2S	Compressor Engine Caterpillar G3406 NA 215 bhp	NO _x	0.95	4.16
		Carbon Monoxide	0.95	4.16
		VOC	0.12	0.53
		PM	0.04	0.16
		PM ₁₀	0.04	0.16
		Benzene	<0.01	0.01
		Formaldehyde	0.10	0.44
		Acetaldehyde	0.01	0.02
		Acrolein	<0.01	0.02
		Methanol	0.01	0.02
		CO _e	218.81	958.39
3S	Compressor Engine Caterpillar G3406 NA 215 bhp	NO _x	0.95	4.16
		Carbon Monoxide	0.95	4.16
		VOC	0.12	0.53
		PM	0.04	0.16
		PM ₁₀	0.04	0.16

		Benzene	<0.01	0.01
		Formaldehyde	0.10	0.44
		Acetaldehyde	0.01	0.02
		Acrolein	<0.01	0.02
		Methanol	0.01	0.02
		CO ₂ e	218.81	958.39
4S	Fugitive Emissions	VOC	0.38	1.67
		n-Hexane	0.02	0.09
		Toluene	<0.01	0.01
		Xylenes	0.01	0.02
		CO ₂ e	30.41	133.19

The following table represents the total controlled facility emissions:

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	12.05
Carbon Monoxide	12.05
Volatile Organic Compounds	2.98
Total Particulate Matter	0.47
PM ₁₀	0.47
Sulfur Dioxide	0.01
Formaldehyde	1.27
Acetaldehyde	0.06
Acrolein	0.06
Benzene	0.03
n-Hexane	0.09
Ethylbenzene	0.02
Methanol	0.06
Toluene	0.01
Xylenes	0.02
Total HAPs	1.66
Carbon Dioxide Equivalent	2,976.71

REGULATORY APPLICABILITY

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

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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.

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)

This facility requires a Construction permit due to the fact that the changes proposed under this permitting action results in an emissions increase above permitting thresholds (NOx and CO). The facility is also subject to substantive requirements: subpart OOOO and subpart JJJJ.

45CSR22 - *Air Quality Management Fee Program*

This facility is a minor source, not subject to 45CSR30, and the NSPS are Title V exempt. This facility is required to keep their Certificate to Operate current. HG Energy paid a \$1,000 construction application fee, a \$1,000 NSPS fee, and a \$2,500 NESHAP. Since this facility has a total reciprocating engine capacity of less than 1,000 hp (635 hp) this facility is subject to 9M with an annual fee of \$200.

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 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 will be three (3) reciprocating compressors associated with 1S, 2S, and 3S at this facility. The compressors associated with engines 1S, 2S, and 3S were constructed after the effective date of this regulation and therefore all three compressors are subject to this section of this regulation. Requirements will include replacing rod packing systems, recordkeeping, and reporting.

- b.
 1. 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.

The pneumatic controllers at this facility will be intermittent or will vent less than 6 scf/hr and therefore this facility is not subject to this section of this regulation.

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 Blacksnake Station is subject to the area source requirements for non-emergency spark ignition engines.

Engines (1S, 2S, and 3S) are a "New Stationary RICE" source at an area source of HAPs and is an affected source because construction will commence after June 12, 2006 [63.6590(a)(2)(iii)] due to the manufacturer's dates of the engine.

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

This regulation states engines 1S, 2S, and 3S must meet the requirements of 40CFR60 subpart JJJJ. Engines 1S and 2S will have no requirements due to the manufacture date of the engine causing it to not be subject to 40CFR60 subpart JJJJ. Engine 3S having a date of manufacture after July 1, 2008. 40CFR60.4248 Table 1 provides the allowable emission standards for stationary spark ignition internal combustion engines. Engine 3S is a non-emergency SI natural gas engine, with maximum engine power $100 \leq \text{hp} < 500$, and manufactured after January 1, 2008 but before January 1, 2011 the allowable emission standards in g/hp-hr are: 2.0 for NO_x, 4.0 for CO, and 1.0 for VOC. The engines will also have operating limits, performance tests, notification requirements, and recordkeeping requirements.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The following information was obtained from USEPA's Air Toxic Website.

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.

Ethyl Benzene

Ethyl benzene is mainly used in the manufacturing of styrene. Acute (short-term) exposure to ethyl benzene in humans results in respiratory effects, such as throat irritation and chest constriction, irritation of the eyes, and neurological effects, such as dizziness. Chronic (long-term) exposure to ethyl benzene by inhalation in humans has shown conflicting results regarding its effects on the blood. Animal studies have reported effects on the blood, liver, and kidneys from chronic inhalation exposure to ethyl benzene. Limited information is available on the carcinogenic effects of ethyl benzene in humans. In a study by the National Toxicology Program (NTP), exposure to ethyl benzene by inhalation resulted in an increased incidence of kidney and testicular tumors in rats, and lung and liver tumors in mice. EPA has classified ethyl benzene as a Group D, not classifiable as to human carcinogenicity.

Toluene

Toluene is added to gasoline, used to produce benzene, and used as a solvent. Exposed to toluene may occur from breathing ambient or indoor air. The central nervous system (CNS) is the primary target organ for toluene toxicity in both humans and animals for acute (short-term) and chronic (long-term) exposures. CNS dysfunction and narcosis have been frequently observed in humans acutely exposed to toluene by inhalation; symptoms include fatigue, sleepiness, headaches, and nausea. CNS depression has been reported to occur in chronic abusers exposed to high levels of toluene. Chronic inhalation exposure of humans to toluene also causes irritation of the upper respiratory tract and eyes, sore throat, dizziness, and headache. Human studies have reported developmental effects, such as CNS dysfunction, attention deficits, and minor craniofacial and limb anomalies, in the children of pregnant women exposed to toluene or mixed solvents by inhalation. Reproductive effects, including an association between exposure to toluene and an increased incidence of spontaneous abortions, have also been noted. However, these studies are not conclusive due to many confounding variables. EPA has classified toluene as a Group D, not classifiable as to human carcinogenicity.

Hexane

Hexane is used to extract edible oils from seeds and vegetables, as a special-use solvent, and as a cleaning agent. Acute (short-term) inhalation exposure of humans to high levels of hexane causes mild central nervous system (CNS) effects, including dizziness, giddiness, slight nausea, and headache. Chronic (long-term) exposure to hexane in air is associated with polyneuropathy in humans, with numbness in the extremities, muscular weakness, blurred vision, headache, and fatigue observed. Neurotoxic effects have also been exhibited in rats. No information is available on the carcinogenic effects of hexane in humans or animals. EPA has classified hexane as a Group D, not classifiable as to human carcinogenicity.

Xylene

Commercial or mixed xylene usually contains about 40-65% *m*-xylene and up to 20% each of *o*-xylene and *p*-xylene and ethyl benzene. Xylenes are released into the atmosphere as fugitive emissions from industrial sources, from auto exhaust, and through volatilization from their use as solvents. Acute (short-term) inhalation exposure to mixed xylenes in humans results in irritation of the eyes, nose, and throat, gastrointestinal effects, eye irritation, and neurological effects. Chronic (long-term) inhalation exposure of humans to mixed xylenes results primarily in central nervous system (CNS) effects, such as headache, dizziness, fatigue, tremors, and incoordination; respiratory, cardiovascular, and kidney effects have also been reported. EPA has classified mixed xylenes as a Group D, not classifiable as to human carcinogenicity. Mixed xylenes are used in the production of ethylbenzene, as solvents in products such as paints and coatings, and are blended into gasoline.

Formaldehyde

Formaldehyde is used mainly to produce resins used in particleboard 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).

AIR QUALITY IMPACT ANALYSIS

Based on the annual emission rates this facility will not be a major source as defined by 45CSR14, so air quality modeling was not performed.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates HG Energy's natural compression facility should meet all applicable requirements. It is recommended that HG Energy's proposed facility Blacksake should be granted a 45CSR13 construction permit.

David Keatley
Permit Writer

Date

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