



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-2720A
Plant ID No.: 061-00149
Applicant: Appalachia Midstream Services, L.L.C. (AMS)
Facility Name: Gans Compressor Station
Location: Monongalia County
SIC Code: 1311
Application Type: Modification
Received Date: March 26, 2010
Engineer Assigned: Jerry Williams II, P.E.
Fee Amount: \$2,000.00
Date Received: March 26, 2010
Complete Date: April 20, 2010
Due Date: July 19, 2010
Applicant Ad Date: April 6, 2010
Newspaper: *The Dominion Post*
UTM's: Easting: 603.39 km Northing: 4397.44 km Zone: 17
Description: Installation of two (2) natural gas fired compressor engines, one (1) natural gas fired generator, one (1) triethylene glycol (TEG) dehydration unit with condenser controls, one (1) 210 bbl condensate/water tank, and miscellaneous support equipment. The existing permitted equipment will be removed.

DESCRIPTION OF PROCESS

The following process description was taken from Permit Application R13-2720A:

The natural gas inlet stream from surrounding area wells enters the facility through an inlet suction separator prior to the gas being compressed. After the inlet gas passes through a compressor, it goes through the dehydration process before exiting the facility. The dehydration unit is used to remove water from the gas. In the dehydration process, gas passes through a contactor vessel where water is absorbed by the glycol. The "rich" glycol containing water goes to the glycol reboiler where heat is used to boil off the water. The heat is supplied by a natural gas-fired reboiler that exhausts to the atmosphere. Overhead still column emissions will be

controlled by an air-cooled condenser. The non-condensables from the still column overheads, as well as flash tank overhead vapors, will be emitted to the atmosphere. Condensate, produced water and other pipeline liquids are stored in a storage tank and transported offsite via truck. A natural gas fired generator will provide back-up electric power to the glycol pump and other electrical equipment at the facility as needed. Emissions from fugitive components also occur.

SITE INSPECTION

A site inspection was conducted on May 10, 2010 by the writer. The writer did not see any issues with the proposed modifications to this facility.

Directions as given in the permit application are as follows:

From Morgantown on I-68 East, take the Cheat Lake exit onto Route 857 North. Go approximately 6 miles and turn right into Laurel Aggregates Quarry. Stay to the left while going toward Lake Lynn Laboratory for 0.9 mile. Turn right, go 0.3 mile. Turn right through gate to compressor site.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Maximum controlled point source emissions from AMS's Gans Compressor Station are summarized in the table below.

Emission Point ID	Emission Unit ID	Process Unit	Pollutant	Maximum Controlled Emission Rate	
				Hourly (lb/hr)	Annual (ton/year)
EPCE-1	EUCE-1	1,775 hp Caterpillar G-3606 Compressor Engine	Nitrogen Oxides	2.74	12.00
			Carbon Monoxide	2.93	12.83
			Sulfur Dioxide	0.03	0.13
			Particulate Matter	0.12	0.53
			Volatile Organic Compounds	1.17	5.12
			Formaldehyde	0.78	3.43
EPCE-2	EUCE-2	1,775 hp Caterpillar G-3606	Nitrogen Oxides	2.74	12.00
			Carbon Monoxide	2.93	12.83
			Sulfur Dioxide	0.03	0.13
			Particulate Matter	0.12	0.53

		Compressor	Volatile Organic Compounds	1.17	5.12
		Engine	Formaldehyde	0.78	3.43
EPGEN-1	EUGEN-1	128 hp Natural Gas Fired Generator	Nitrogen Oxides	0.56	2.45
			Carbon Monoxide	1.13	4.95
			Sulfur Dioxide	0.01	0.01
			Particulate Matter	0.02	0.09
			Volatile Organic Compounds	0.28	1.23
EPSTL-1	EUSTL-1	20 MMscfd Glycol Dehydrator Still Column	Volatile Organic Compounds	3.29	14.40
			Benzene	0.01	0.02
			Ethylbenzene	0.01	0.01
			Toluene	0.59	2.59
			Xylenes	0.89	3.88
			n-Hexane	0.08	0.33
EPRBL-1	EURBL-1	0.55 mmBTU/hr Glycol Dehydrator Reboiler	Nitrogen Oxides	0.06	0.26
			Carbon Monoxide	0.05	0.22
			Sulfur Dioxide	0.01	0.01
			Particulate Matter	0.01	0.01
			Volatile Organic Compounds	0.01	0.01
EPTK-1	EUTK-1	210 bbl Pipeline Fluids Storage Tank	Volatile Organic Compounds	NA	0.72

REGULATORY APPLICABILITY

Unless otherwise stated WVDEP DAQ did not determine whether the permittee is subject to an area source air toxics standard requiring Generally Achievable Control Technology (GACT) promulgated after January 1, 2007 pursuant to 40 CFR 63, including the area source air toxics provisions of 40 CFR 63, Subpart HH and 40 CFR 63, Subpart ZZZZ.

The following rules apply to the facility:

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

AMS 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)

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. No odors have been deemed 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)

45CSR13 applies to this source due to the fact that AMS exceeds the regulatory emission threshold for criteria pollutants of 6 lb/hr and 10 ton/year, and AMS is subject to a substantive requirement of an emission control promulgated by the Secretary.

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)

45CSR16 applies to this source by reference of 40CFR60, Subpart KKK, and 40CFR60, Subpart JJJJ. AMS is subject to the recordkeeping, monitoring, and testing required by 40CFR60, Subpart KKK, 40CFR60, Subpart VV, 40CFR60, and 40CFR60, Subpart JJJJ.

45CSR30 (Requirements for Operating Permits)

AMS is a nonmajor source subject to 45CSR30. AMS is subject to 45CSR30 due to them being subject to 40CFR60 Subpart KKK, and 40CFR60 Subpart JJJJ.

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

AMS's compressor engines are subject to 40CFR60 Subpart JJJJ, which sets forth emission limits, fuel requirements, installation requirements, and monitoring requirements based on the year of installation of the subject internal combustion engine. 40CFR60 Subpart JJJJ is applicable to owners and operators of new stationary spark

ignition internal combustion engines manufactured after July 1, 2007, for engines with a maximum rated power capacity greater than 500 hp. The two (2) new proposed 1,775 hp engines (EPCE-1, EPCE-2) will be subject to this rule. The emission limits for these engines are the following: NO_x – 2.0 g/hp-hr (7.83 lb/hr); CO – 4.0 g/hp-hr (15.66 lb/hr); and VOC – 1.0 g/hp-hr (3.92 lb/hr). The new proposed 128 hp engine (EPGEN-1) will be subject to this rule. The emission limits for these engines are the following: NO_x – 2.0 g/hp-hr (0.56 lb/hr); CO – 4.0 g/hp-hr (1.13 lb/hr); and VOC – 1.0 g/hp-hr (0.28 lb/hr). Based on the manufacturer's specifications for these engines, the emission standards will be met. Because the engines will not be certified by the manufacturer, AMS 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.

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. The Gans Compressor Station is subject to this rule due to the natural gas liquids extraction plant. AMS must meet the LDAR requirements of Subpart KKK.

The following rules do not apply to the facility:

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 tank that AMS has proposed to install is 33.39 cubic meters. Therefore, they would not be subject to this rule.

40CFR63 Subpart ZZZZ (National Emission Standards for Reciprocating Ignition Internal Combustion Engines)

40CFR63 Subpart HH (National Emission Standards for Hazardous Air Pollutants: Oil and Natural Gas Production and National Emission Standards for Hazardous Air Pollutants: Natural Gas Transmission and Storage)

40CFR63 Subpart HHH (National Emission Standards for Hazardous Air Pollutants: Natural Gas Transmission and Storage)

WVDEP DAQ did not determine whether the permittee is subject to an area source air toxics standard requiring Generally Achievable Control Technology (GACT) promulgated after January 1, 2007 pursuant to 40 CFR 63, including the area source air toxics provisions of 40 CFR 63, Subpart HH and 40 CFR 63, Subpart ZZZZ.

These promulgated national emission standards for hazardous air pollutants (NESHAP) limit emissions of hazardous air pollutants (HAP) from oil and natural gas production and natural gas transmission and storage facilities. These final rules implement section 112 of the Clean Air Act (Act) and are based on the Administrator's determination that oil and

natural gas production and natural gas transmission and storage facilities emit HAP identified on the EPA's list of 188 HAPs.

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.

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.

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).

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.

Acetaldehyde

Acetaldehyde is mainly used as an intermediate in the synthesis of other chemicals. It is ubiquitous 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 inadequate human cancer studies and animal studies that have shown nasal tumors in rats and laryngeal tumors in hamsters.

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.

Ethylbenzene

Ethylbenzene is mainly used in the manufacture of styrene. Acute (short-term) exposure to ethylbenzene 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 ethylbenzene 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 ethylbenzene. Limited information is available on the carcinogenic effects of ethylbenzene in humans. In a study by the National Toxicology Program (NTP), exposure to ethylbenzene by inhalation resulted in an increased incidence of kidney and testicular tumors in rats, and lung and liver tumors in mice. EPA has classified ethylbenzene 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.

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.

Xylene

Commercial or mixed xylene usually contains about 40-65% m-xylene and up to 20% each of o-xylene and p-xylene and ethylbenzene. 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.

AIR QUALITY IMPACT ANALYSIS

The changes to this facility do not constitute a major modification under 45CSR14. Based on the nature of the emissions and the annual emission rate, no air quality analysis was performed. However, air dispersion modeling will be required if the Director finds existing circumstances and/or submitted data that provide cause for an assessment to be made concerning whether this facility may interfere with attainment or maintenance of an applicable ambient air quality standard or cause or contribute to a violation of an applicable air quality increment.

MONITORING OF OPERATIONS

AMS will be required to perform the following monitoring:

1. Monitor and record quantity of natural gas consumed for all engines, and combustion sources.

AMS will be required to perform the following recordkeeping:

1. Maintain records of the amount of natural gas consumed in each combustion source.
2. 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
3. Maintain the corresponding records specified by the on-going monitoring requirements of and testing requirements of the permit.
4. Maintain records of the visible emission opacity tests conducted per the permit.
5. 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.
6. The records shall be maintained on site or in a readily available off-site location maintained by AMS for a period of five (5) years.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates AMS's Gans Compressor Station meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Monongalia County location should be granted a 45CSR13 modification permit for their facility.

Jerry Williams II, P.E.
Engineer

Date