



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-2771A
Plant ID No.: 091-00025
Applicant: CDX Gas, LLC (CDX)
Facility Name: Hillman II Compressor Station
Location: Flemington, Taylor County
SIC Code: 4922
Application Type: Modification
Received Date: May 7, 2012
Engineer Assigned: Roy F. Kees, P.E.
Fee Amount: \$2,000.00
Date Received: August 2, 2012
Complete Date: August 6, 2012
Due Date: November 6, 2012
Applicant Ad Date: May 9, 2012
Newspaper: *The Barbour Democrat*
UTM's: Easting: 572.46 km Northing: 4349.95 km Zone: 17
Description: Removal of four existing engines, and installation of two engines and four tanks.

DESCRIPTION OF PROCESS

The following process description was taken from Permit Application R13-2771A:

Coal bed methane is pumped out of the coal seam. Currently, it is routed through the compressors where it is compressed to a higher pressure. The gas is dried through the dehydration unit prior to discharge into the pipeline system. The coal bed methane fuels the internal combustion engines that provide the power for the compressors and the reboiler for the dehydration unit.

CDX proposes to install and operate two (2) 670 hp Caterpillar 3508TALE compressor engines (CE-1 and CE-2). CDX also proposes adding two (2) 140 barrel Sulfa-Treat tanks, one (1) 2000 gallon lube oil tank to replace the existing 100 gallon lube oil tank, one (1) 210 barrel water tank to replace the existing 200 gallon water tank, one (1) 100 barrel waste tank and one (1) 2000 gallon Methanol tank.

SITE INSPECTION

In March 2008 three (3) citizen complaints were filed with the DAQ in regards to odor issues. These complaints were investigated by Brian Tephabock of DAQ’s North Central Regional Office. Upon investigating the complaints, the inspector was unable to detect and offsite odors. However he did contact CDX and spoke with Steve Polly, land coordinator for CDX. Mr. Polly said he had been contacted by the citizens and CDX was working on a resolution for these odor problems. In May 2008 Mr. Tephabock spoke with Mr. Polly to receive an update on the odor control issue. Since the March incident CDX had installed a sulfur treatment vessel that specifically absorbs odor and moisture from the gas. These updates were completed during the week of May 12, 2008. According to Mr. Tephabock’s report, the closest complainant has stated that he has not detected any odors recently. Mr. Tephabock concluded in his report that CDX has taken an active involvement in correcting this problem and feel that they will continue to address any problems that may occur in the future.

Directions as given in the permit application are as follows:

From I-79 take exit 124. Go east on 279 to US Route 50. Turn left onto Route 50 east. Follow Route 50 for 2.5 miles to access road on the right. Follow access road to strip bench and continue east on bench to the compressor site.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Maximum controlled point source emissions from CDX's natural gas compressor station are summarized in the table below. Emissions from the two 670 hp Caterpillar 3508TALE Compressor Engines were calculated using manufacturer data as well as AP-42. This modification will not incorporate any changes to any other equipment, however, VOC emissions from the dehy still vent (RSV-1) were updated to reflect changes in the gas composition. The dehy calculations were provided using Gly-Calc 4.0 with inputs from an updated gas analysis dated February 1, 2012.

Emission Point ID	Emission Unit ID	Process Unit	Pollutant	Maximum Controlled Emission Rate	
				Hourly (lb/hr)	Annual (ton/year)
EP-1	CE-1	Caterpillar G3508TALE Compressor Engine	Nitrogen Oxides	2.95	12.92
			Carbon Monoxide	2.72	11.89
			Sulfur Dioxide	<0.01	0.01
			Particulate Matter-10	<0.01	<0.01
			Volatile Organic Compounds	0.44	1.94
			Formaldehyde	0.27	1.16
			CO ₂ e	690	3,025

EP-2	CE-2	Caterpillar G3508TALE Compressor Engine	Nitrogen Oxides	2.95	12.92
			Carbon Monoxide	2.72	11.89
			Sulfur Dioxide	<0.01	0.01
			Particulate Matter-10	<0.01	<0.01
			Volatile Organic Compounds	0.44	1.94
			Formaldehyde	0.27	1.16
			CO ₂ e	690	3,025
APR-1	AP-1	6.13 mmbtu/hr Amine Plant Reboiler	Nitrogen Oxides	0.63	2.74
			Carbon Monoxide	0.53	2.30
			Sulfur Dioxide	0.01	0.02
			Particulate Matter-10	0.02	0.06
			Volatile Organic Compounds	0.04	0.15
APV-1	AP-1	60 gpm Amine Plant Vent	Hydrogen Sulfide	1.09	4.76
RBV-1	RBV-1	0.75 mmBtu/hr Glycol Dehydrator Reboiler	Nitrogen Oxides	0.08	0.33
			Carbon Monoxide	0.07	0.28
			Volatile Organic Compounds	0.01	0.02
			Particulate Matter-10	0.01	0.01
RSV-1	RSV-1	25 mmscf/day Glycol Dehydrator Still Vent	Volatile Organic Compounds	0.01	0.01

There are six tanks located at the facility. One 210 barrel water tank, one 2,000 gallon lube oil tank, two 140 barrel sulfa-treat tanks for odor control, one 2,000 gallon methanol tank, and one 100 barrel waste oil tank. After meeting with Jesse Hanshaw, it was determined based on the gas analysis, that the liquids in the 210 barrel water tank would be primarily water and the VOC emissions would be negligible.

REGULATORY APPLICABILITY

The following rules apply to the facility:

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

45CSR2 defines the engines as ‘type b’ units meaning the allowable particulate matter emissions would be $0.09 * \text{heat input rating (MMBtu)}$. For a 6.13 MMBtu/hr reboiler unit (APR-1), the allowable particulate matter emissions would be 0.56 lb/hr. CDX’s potential emissions from APR-1 are 0.06 lb/hr. Therefore, CDX would meet these requirements. In addition, CDX would be subject to the opacity requirements in 45CSR2.

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 offsite odors have been deemed objectionable. However, DAQ and CDX have been contacted by citizens that an odor issue does exist. In response to these concerns CDX has installed odor treatment equipment to address these issues. CDX installed the SulfaTreat Process. The SulfaTreat process is a chemical reaction that removes the hydrogen sulfide from the gas stream via specially designed reactant products. The equipment consists of a fixed-bed or batch type granular hydrogen sulfide reactant contained in a pressure vessel. During the process, sour gas or vapor flows through the consistently sized and shaped granular SulfaTreat product in the bed, where the hydrogen sulfide reacts with the product to form a stable and safe byproduct.

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 they exceed the regulatory emission threshold for criteria pollutants of 6 lb/hr and 10 ton/year and they are also subject to a substantive requirement of an emission control rule promulgated by the Secretary (40CFR60 Subpart JJJJ). CDX has complied with the public review procedures in 45CSR§13-8.3. by publishing a legal ad in *The Barbour Democrat* on May 9, 2012. CDX also paid the required \$1000.00 application fee and the \$1000.00 NSPS fee.

45CSR22 (Air Quality Management Fee Program)

With the issuance of this permit CDX is no longer a major source subject to 45CSR30. CDX was subject to 45CSR30 due to potential NO_x emissions exceeding 100 tons/year and formaldehyde emissions exceeding 10 tons/year, but by removing the six permitted engines and replacing with two smaller units, this is no longer the case.

This rule establishes a program to collect fees for certificates to operate and for permits to construct, modify or relocate sources of air pollution. Funds collected from these fees will be used to supplement the Director's budget for the purpose of maintaining an effective air quality management program. The facility will demonstrate compliance with this rule by obtaining a Certificate to Operate (CTO) and paying annual fees in order to maintain a current CTO.

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

40CFR60 Subpart JJJJ 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 670 hp engines will be subject to this rule. The emission limits for these engines are the following: NO_x – 2.0 g/hp-hr (5.91 lb/hr); CO – 4.0 g/hp-hr (11.82 lb/hr); and VOC – 1.0 g/hp-hr (2.96 lb/hr). Based on the manufacturer's specifications for these engines, the emission standards will be met. Because the engines are not certified by the manufacturer, CDX will be required to demonstrate compliance by keeping a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, CDX must conduct an initial performance test within 1 year of engine startup and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

40CFR60 Subpart LLL (Standards of Performance for Onshore Natural Gas Processing: SO₂ Emissions)

40CFR60 Subpart LLL sets standards for SO₂ emissions from any natural gas sweetening unit and each sweetening unit followed by a sulfur recovery unit. Since the Amine unit's H₂S emissions are less than 2 long tons per day, than the Hillman II station is only required to comply with §60.647(c). This section states: To certify that a facility is exempt from the control requirements of these standards, each owner or operator of a facility with a design capacity less than 2 LT/D of H₂S in the acid gas (expressed as sulfur) shall keep, for the life of the facility, an analysis demonstrating that the facility's design capacity is less than 2 LT/D of H₂S expressed as sulfur.

The following regulations do not apply to the facility:

45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants)

As shown in the table below, CDX is not subject to 45CSR14 review.

Pollutant	PSD (45CSR14) Threshold (tpy)	Hillman PTE (tpy)	45CSR14 Review Required?
CO ₂ e	100,000	6,107.74	No
Carbon Monoxide	250	26.36	No
Nitrogen Oxides	250	28.91	No
Sulfur Dioxide	250	0.04	No
Ozone (VOC)	250	31.45	No
Particulate Matter (TSP, PM10, PM2.5)	250	0.08	No

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)

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.

CDX will claim the less than 1 ton/year of Benzene exemption. Therefore, they are not subject to this rule. CDX will be required to show compliance with the following:

The actual average emissions of benzene from the individual still vent of the glycol dehydration unit to the atmosphere shall be less than 1.0 ton per year (0.9 megagram per year). Emissions shall be determined either uncontrolled, or with federally enforceable controls in place.

CDX shall determine the actual average benzene emission using the model GRI-GLYCalc™, Version 3.0 or higher, and the procedures presented in the associated GRI-GLYCalc™ Technical Reference Manual. Inputs to the model shall be representative of actual operating conditions of the glycol dehydration unit and may be determined using the procedures documented in the Gas Research Institute (GRI) report entitled “Atmospheric Rich/Lean Method for Determining Glycol Dehydrator Emissions” (CGR-95/0368.1); or

CDX shall determine an average mass rate of benzene emissions in kilograms per hour through direct measurement using the methods set forth in either 40 CFR 63.772(b)(2)(ii) or 40 CFR 63.1282(a)(2)(ii), as applicable. Annual emissions in kilograms per year shall be determined by multiplying the mass rate by the number of hours the unit is operated per year. This result shall be converted to megagrams per year. [§63.772(b)(2)(i)-(ii) or §63.1282(a)(2)(i)-(ii)]

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.

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).

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.

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.

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 facility will not be a major source as defined by 45CSR14. Based on the nature of the emissions and the annual emission rate, no air quality impact analysis was performed.

MONITORING OF OPERATIONS

The two (2) new compressor engines (CE-1, CE-2) will be subject to 40CFR60 Subpart JJJJ. . Because the engines are not certified by the manufacturer, CDX will be required to demonstrate compliance by keeping a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, CDX must conduct an initial performance test within 1 year of engine startup and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

In regards to the other equipment:

CDX will be required to perform the following monitoring:

1. Monitor and record quantity of natural gas consumed for all engines, and combustion sources, and glycol dehydrators.
2. Maintain for the life of the facility, an analysis demonstrating the Amine plant's design capacity is less than 2 long tons per day of H₂S expressed as sulfur.

CDX will be required to perform the following recordkeeping:

1. Maintain records of the amount of natural gas consumed in the natural gas compressor engines, amine plant reboiler, and the glycol dehydration unit.
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. Maintain a record of the wet natural gas throughput through the dehydration system to demonstrate compliance with the natural gas throughput limit set forth in the permit.
7. The records shall be maintained on site or in a readily available off-site location maintained by CDX for a period of five (5) years.

CHANGES TO PERMIT R13-2771

Permit application R13-2771A is for removal of four existing engines, and installation of two engines and four tanks. Also, the addition of 40CFR60 Subpart LLL language for the existing Amine plant.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates CDX's natural gas compressor station meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Taylor County location should be granted a 45CSR13 modification permit for their facility.

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

Date