



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3145
Plant ID No.: 051-00139
Applicant: Williams Ohio Valley Midstream LLC
Facility Name: Corley Station
Location: Marshall County
NAICS Code: 21111
Application Type: Modification
Received Date: October 16, 2013
Engineer Assigned: David Keatley
Fee Amount: \$4,500
Date Fee Received: October 16, 2013
Complete Date: March 19, 2014
Due Date: June 17, 2014
Applicant Ad Date: October 11, 2013
Newspaper: *Moundsville Daily Echo*
UTM's: Easting: 520.122 km Northing: 4,400.543 km Zone: 17
Description: Applicant proposes permitting one (1) 60 MMscfd TEG dehydrator, two (2) 4.5 MMBTU/hr VOC combustors, thirteen (13) 200 kW microturbines, and one (1) 9.7 MMBTU/hr hot oil heater, and one (1) 1,340 bhp compressor engine.

DESCRIPTION OF PROCESS

Natural gas enters the facility via pipeline. Natural gas enters the inlet separator reducing the velocity of the natural gas stream allowing liquids to drop out of the stream. Compressor engines (CE-01 through CE-04) are used to power associated compressors to increase the pressure of the natural gas steam. Engines CE-01 and CE-02 are 1,380 bhp four-stroke lean-burn natural gas fired Caterpillar 3516B compressor engines equipped with an Emit oxidation catalyst, which will reduce the air emissions by at least the following percentages: CO, 94%; VOCs, 92%; and formaldehyde, 92%. Engine CE-04 is a 1,340 bhp four-stroke lean-burn Caterpillar 3516LE natural gas fired compressor engine equipped with a Miratech oxidation catalyst, which will reduce air emissions by

at least the following percentages: CO, 90%; VOCs 70%; and formaldehyde, 90%. Engine CE-03 is a 840 bhp four-stroke rich-burn Waukesha 3524GSI natural gas fired compressor engine which has a Miratech catalyst, which will reduce the air emissions by at least the following percentages: NO_x, 97%; CO, 98%; VOC, 17%; and formaldehyde, 20%. The liquids from the inlet separator are sent to a coalescing filter. In the coalescing filter the fraction that is a majority water goes to one of the produced fluids tanks (T01 or T02) and the condensate goes to the blow case. In the blow case the liquids go to a gathering line and the vapors are sent to the compressor associated with CE-03. The liquids from the blow case are sent to a gathering line and the vapors are compressed by proposed engine CE-03.

The compressed natural gas stream and compressed vapor stream from the blow case are sent to one of three contactors having the following capacities 20 MMCF/day, 20 MMCF/day, and 50 MMCF/day. In the contactors triethylene glycol (TEG) flows countercurrent to the natural gas stream to remove moisture from the natural gas stream. The compressed dehydrated natural gas exits the facility via pipeline. The rich TEG from the contactors is sent to the flash tanks which allows a pressure drop, allowing vapors to flash. Vapors from the flash tanks are sent to the flame zone of each respective reboiler and the liquid is sent to the respective regenerator. The vapors of the condensate tanks will be controlled by two (2) 4.5 MMBTU/hr VOC combustors (COMB-1 and COMB-2) which will have a 98% control efficiency. Proposed Reboiler RBV-3 has a rating of 1.00 MMBTU/hr; and both Reboiler RBV-1 and Reboiler RBV-2 has a rating of 0.75 MMBTU/hr. The regenerators are heated by the reboilers to remove water from the rich TEG. The vapors from the regenerators are sent to condensers and the lean TEG goes back to the contactor. The vapors from the condenser are sent back to flame zone of the respective reboiler (RBV-1, RBV-2, or RBV-3) for a destruction efficiency of 95% or the VOC Combustors. The liquids from the condensers are sent to one of the produced liquids tanks.

SITE INSPECTION

A site inspection was conducted on April 26, 2011 by the Jerry Williams, P.E. The permittee met the siting requirements set forth in G35-A.

Directions as given in the permit application are as follows:

From Moundsville, proceed south on Route 2 approximately 11 miles to Woodland and Graysville Road (Co. Highway 27). Proceed on this road approximately one mile and turn at the second right onto Rines Ridge Road (Co. Highway 76). Proceed approximately 6 miles. Site is approximately 500 feet to the right on 86 Rines Ridge Road.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions for heater HTR-1 were estimated using AP-42 with the exception of CO₂e which used 40CFR98. Emissions for RSV-4 were estimated using HYSYS with the exception of CO₂e which used 40CFR98. Emissions for CT-01 through CT-13 were estimated with manufacturer's emission factors for NO_x, CO, and VOCs, the rest of the emissions were estimated with AP-42 with the exception of CO₂e which used 40CFR98.

The VOCs combustors emissions were estimated with AP-42 with the exception of CO₂e which used 40CFR98. Working and Breathing losses for the condensate tanks were estimated with TANKS 4.0.9d and the flash emissions were estimated by using the Vasquez-Beggs Solution. The truck loading will be estimated with AP-42.

The following table summarizes the controlled estimated regulated air pollutants for newly permitted emission units.

Table 1: Estimated Maximum Controlled Air Emissions for Newly Permitted/Modified Units

Source ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
HTR-1	Heater 9.7 MMBTU/hr	Nitrogen Oxides	0.95	4.18
		Carbon Monoxide	0.8	3.51
		Volatile Organic Compounds	0.05	0.23
		Sulfur Dioxide	0.01	0.03
		Particulate Matter	0.07	0.32
		n-Hexane	0.02	0.08
		Carbon Dioxide Equivalents	1135	4985
RSV-4	Ethylene Glycol Dehydrator Still Vent (60 MMscfd)	Volatile Organic Compounds	0.21	0.93
		Benzene	0.06	0.25
		Ethylbenzene	0.06	0.25
		Toluene	0.06	0.25
		Xylenes	0.06	0.25
		n-Hexane	0.06	0.25
		Carbon Dioxide Equivalents	2	7

CT-01 thru CT-13	Capstone Microturbines C200 NG 200 ekW (each)	Nitrogen Oxides	0.16	0.70
		Carbon Monoxide	0.44	1.93
		Volatile Organic Compounds	0.02	0.09
		Sulfur Dioxide	0.01	0.04
		Total Particulate Matter	0.02	0.07
		PM ₁₀	0.02	0.07
		Formaldehyde	<0.01	0.01
		Carbon Dioxide Equivalents	251	1,101
COM B-1 and COM B-2	Vapor Combustors 4.5 MMBTU/hr (each)	Nitrogen Oxides	0.44	1.93
		Carbon Monoxide	0.37	1.62
		Carbon Dioxide Equivalents	527	2,306
T01 and T02	Condensate Tank #1 (Modified)	Volatile Organic Compounds	0.51	2.23
		Benzene	1.19	5.22
		Ethylbenzene	0.03	0.11
		Toluene	0.03	0.11
		Xylenes	0.03	0.11
		n-Hexane	1.19	5.22
TLO	Truck Loadout	Volatile Organic Compounds	-	3.23
		Benzene	-	0.32
		Ethylbenzene	-	0.32
		Toluene	-	0.32
		Xylenes	-	0.32
SSM	Startup, Shutdown, and Maintenance	Volatile Organic Compounds	-	38.91
		Benzene	-	0.01
		Ethylbenzene	-	0.01
		Toluene	-	0.02
		Xylenes	-	0.02
		n-Hexane	-	0.62
		Carbon Dioxide Equivalents	-	2,832
FUG	Process Piping Fugitives	Volatile Organic Compounds	2.78	12.17
		Carbon Dioxide Equivalents	88	387
FUG2	Miscellaneous Equipment Leaks	Volatile Organic Compounds	3.35	14.69
		Benzene	<0.01	0.01

	Ethylbenzene	<0.01	0.01
	Toluene	<0.01	0.01
	Xylenes	<0.01	0.01
	Carbon Dioxide Equivalents	245	1,074

The following table represents the lists the current emissions, proposed emissions, and the change in emissions associated with this modification.

Table 2: Estimated Maximum Controlled Total Facility Emissions and Change

Pollutant	Current Maximum Annual Facility Wide Emissions (tons/year)	Proposed Maximum Annual Facility Wide Emissions (tons/year)	Change in Emissions (tons/year)
Nitrogen Oxides	37.90	55.20	17.30
Carbon Monoxide	11.62	43.55	31.93
Volatile Organic Compounds	18.79	96.82	78.03
Total Particulate Matter	2.18	3.74	1.56
PM ₁₀	2.18	3.74	1.56
Sulfur Dioxide	0.11	0.61	0.50
Formaldehyde	0.4	1.74	1.34
Benzene	0.02	0.96	0.94
Ethylbenzene	-	0.80	0.80
Toluene	-	1.04	1.04
Xylenes	-	0.97	0.97
Carbon Dioxide Equivalents	-	56,969	56,969

REGULATORY APPLICABILITY

The following rules and regulations apply to this facility due to this modification.

45CSR2 - *To Prevent and Control Particulate Air Pollution From Combustion of Fuel in Indirect Heat Exchangers*

Heater HTR-1 at this facility meets the definition for fuel burning unit (section 2.10). This heater has a capacity below the 10 MMBTU/hr threshold is exempt from the following sections: 4,5,6,8, and 9.

HTR-1 shall not cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air which is greater than ten (10) percent 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*

The facility is subject to the requirements of 45CSR4 and shall not allow the

discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.

45CSR10 - *To Prevent and Control Air Pollution From the Emissions of Sulfur Oxides*

Heater HTR-1 at this facility meets the definition for fuel burning unit (section 2.8). HTR-1 is a Type 'b' fuel burning unit, which are below the 10 MMBTU threshold and are therefore exempt from sections 3, 6, 7, and 8 (Section 10.1). This facility is in Marshall County and is in Priority Classification I. This heater is not consider a manufacturing process, refinery, or process gas stream.

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 increase in regulated uncontrolled air pollutants of 6 lb/hr and 10 ton/year (NO_x, CO, and VOCs).

45CSR22 - *Air Quality Management Fee Program*

The facility is subject to the requirements of 45CSR22. This source has total engine capacity greater than 1,000 hp (4,936 hp) and is a 8D source and shall pay an annual fee of \$500.

40 CFR 63 Subpart HH - *National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities*

On June 1, 2013 the DAQ took delegation of the area source provisions of 40 CFR 63, Subpart HH. Corley Station is a natural gas production facility that processes, upgrades, or stores natural gas prior to transmission. Corley Station is an area source of HAPs refer to the previous facility wide emissions table.

Pursuant to §63.760(b)(2), each glycol dehydration unit (GDU) located at an area source that meets the requirements under §63.760(a)(3) is defined as an affected facility under Subpart HH. The requirements for affected sources at area sources are given under §63.764(d). However, for a GDU, exemptions to these requirements are given under §63.764(e)(2) “actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram [1 TPY] per year.”

The maximum PTE of benzene emissions from the GDU process vents are all well below 1 tpy (RSV-1, RSV-2, and RSV-3). Therefore, the GDU is exempt from the Subpart HH requirements given under §63.764(d).

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 date of construction, date of manufacture, and horsepower (hp) of the spark ignition internal combustion engine. This subpart does not apply to CE-03 and CE-04. This subpart applies to engines CE-01 and CE-02 because the site will commence construction after June 12, 2006 engines will be manufactured on or after July 1, 2007 and exceeds 1,350 hp. These engines will have a manufacture date after July 1, 2010 and are required to meet the following emission standards in g/hp-hr: NO_x, 1.0; CO, 2.0; and VOC, 0.7. To demonstrate compliance with the emission standards both engines will be required to have an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first. The performance tests will be for the regulated air pollutants NO_x, CO, and VOCs. Both engines will also have to keep maintenance records.

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. This facility is subject to the area source requirements for non-emergency spark ignition engines.

Engine CE-03 and CE-04 are "Existing Stationary RICE" source at an area source of HAPs and is an affected source because construction will commenced before June 12, 2006 [63.6590(a)(1)(iii)] due to the manufacturer's dates (DOM November 26, 1999 and CE-04 will assumed to be before June 12, 2006 due to regulatory discussion provided in application) of the engines.

Engines CE-03 and CE-04 due to the manufacturer's dates of the engines must comply with the applicable emission limitations, operating limitations, and other requirements no later than October 19, 2013. Engine CE-03 is a non-emergency non-black start remote four-stroke rich-burn at an area source of HAPs and is > 500 hp and is therefore subject to Table 2d(11). Engine CE-04 is a non-emergency non-black start remote four-stroke lean-burn at an area source of HAPs and is > 500 hp and is therefore subject to Table 2d(8). Williams has provided maps which seems to show there being only six residences in the

designated area to demonstrate the facility is remote. Engines CE-03 and CE-04 will have oil, oil filter, spark plug, hose, and belt maintenance 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 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 four (4) reciprocating compressors at this facility. Three (3) of the compressors are not subject to this section of the regulation because the compressors commenced construction prior to the effective date of this regulation. However the compressor associated with engine CE-01 is subject to this section of this regulation.

- 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.

This facility will be considered a natural gas processing plant. The pneumatic controllers at this facility will be operated with compressed air and are not subject to this section of this regulation.

- c. 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.

This regulation 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.

Tanks T01 and T02 are storage vessels and were constructed after August 23, 2011 and are group 1 storage vessels based on installation dates. Tanks T01 and T02 located at this facility and emit less than 6 tpy of controlled VOCs each (1.12 tpy each) and therefore these storage vessels are not affected facilities.

- d. This facility has an affected facility under §60.5365(f). There will be equipment leak standards.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

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

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.

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.

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.

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.

CHANGES TO PERMIT G35-A054D

The facility will include equipment to remove natural gas liquids. The applicant proposes permitting one (1) 60 MMscfd TEG dehydrator, two (2) 4.5 MMBTU/hr VOC combustors, thirteen (13) 200 kW microturbines, and one (1) 9.7 MMBTU/hr hot oil heater, and one (1) 1,340 bhp compressor engine. The vapors from the flash tanks will be sent to condensate tanks T01 and T02 rather than being used as fuel for the reboilers. Permit 13-3145 will supersede and replace G35-A054D.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that compliance with all state and federal air quality requirements will be achieved. Therefore, I recommend to the Director of Air Quality the issuance of Permit Number R13-3145 to Williams Ohio Valley Midstream LLC for Corley Station which is located near Fairview, Marshall County, WV.

David Keatley
Permit Writer - NSR Permitting

April 1, 2014

Date

Fact Sheet 13-3145
Williams Ohio Valley Midstream LLC
Corley Station