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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3074
Plant ID No.:	051-00161
Applicant:	Williams Ohio Valley Midstream LLC
Facility Name:	Zien Station
Location:	near Moundsville, Marshall County
NAICS Code:	213112
Application Type:	Construction
Received Date:	April 22, 2013
Engineer Assigned:	David Keatley
Fee Amount:	$2,000 ($1,000 construction + $1,000 NSPS)
Date Fee Received:	April 29, 2013
Complete Date:	September 12, 2013
Due Date:	December 11, 2013
Applicant Ad Date:	April 23, 2013
Newspaper:	*Moundsville Daily Echo*
UTM's:	Easting: 536.142 km Northing: 4,415.7 km Zone: 17
Description:	Installation of one (1) compressor engine, one (1) triethylene glycol (TEG) dehydration unit, and one (1) produced water tank.

DESCRIPTION OF PROCESS

This facility receives natural gas from local natural gas wells. The natural gas stream will be compressed to a higher pressure by one (1) natural gas compressor. The compressor will be powered by one (1) 384 bhp (DOM October 2000) AJAX DPC-2802 LE two-stroke lean-burn natural gas fired engine CE-01. The natural gas will then be sent to a triethylene (TEG) dehydration unit to reduce the water vapor content of the natural gas. TEG will flow countercurrent to the 7 MMscf/day natural gas stream in the contactor. The compressed dryer natural gas will exit the facility via the natural gas sales pipeline. The rich TEG will be sent to the flash tank to remove the lighter hydrocarbons. At least 85% of the flash tank vapors will be used as fuel in the reboiler RBV-1. The liquids from the flash tank will flow to the regenerator to liberate the water and entrained hydrocarbons. The vapors from the regenerator will be controlled with a condenser. The 0.375

mmbtu/hr reboiler RBV-1 combusts natural gas and warms the rich TEG to encourage liberation of the entrained water.

SITE INSPECTION

Steven Sobutka from DAQ's Compliance and Enforcement Section performed a site visit on September 16, 2013. Land clearing for this location does not seem to have been started at the time of the site visit. The area is remote farmland with no nearby residences within 500+ feet.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions for CE-1 were estimated from AJAX emission factor and AP-42 emission factors.

Emissions for RSV-1 were estimated with GRI-GLYCalc 4.0 with a representative extended gas analysis from Carmichael which is also in Marshall County. RSV-1 is the combined emissions from the regenerator and flash tank. There was a 20% contingency on the emissions from RSV-1.

Reboiler and truck loadout emissions use AP-42 factors to estimate emissions.

Flash Emissions for the produced water tanks were obtained from HYSYS; and the working and breathing losses were estimated with EPA-450/3-85-001a.

The following table summarizes the estimated controlled emissions:

Source ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
CE-1	Compressor Engine AJAX DPC-2802 LE 384 bhp	NO_x	1.76	7.73
		CO	1.06	4.64
		VOC	1.06	4.64
		SO_2	<0.01	0.0`1
		PM	0.17	0.73
		PM_{10}	0.17	0.73
		Formaldehyde	0.26	1.16
		CO_2e	472	2,069
RSV-1	TEG Dehydrator Still Vent and Flash Tank 7 MMscf/day	VOC	1.99	8.70
		Benzene	0.04	0.17
		Ethylbenzene	0.01	0.04
		n-Hexane	0.06	0.26
		Toluene	0.06	0.24
		Xylenes	0.04	0.18
		CO_2e	77	337

RBV-1	Reboiler 0.2 MMBTU/hr	NO_x	0.02	0.10
		CO	0.02	0.08
		VOC	<0.01	0.01
		PM	<0.01	0.01
		PM_{10}	<0.01	0.01
		CO_2e	26	114
T01	Produced Fluids Tank 8,820 gallons	VOC	0.56	2.45
TLO	Truck Loadout 70,560 gallons/year	VOC	0.04	0.17
		Benzene	<0.01	0.02
SSM	Startup, Shutdown, and Maintenance	VOC	-	2.49
		n-Hexane	-	0.08
		Benzene	-	0.01
		Toluene	-	0.01
		Ethylbenzene	-	0.01
		Xylenes	-	0.03
		CO_2e	-	147
FUG	Fugitive Emissions	VOC	0.91	3.97
		n-Hexane	0.04	0.16
		Benzene	<0.01	0.02
		Toluene	<0.01	0.02
		Ethylbenzene	<0.01	0.02
		Xylenes	0.01	0.06
		CO_2e	-	333

The following table represents the estimated total controlled facility wide emissions:

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	7.82
Carbon Monoxide	4.72
Volatile Organic Compounds	22.41
Particulate Matter	0.74
PM_{10}	0.74
Sulfur Dioxide	0.01
Formaldehyde	1.16
Benzene	0.49
n-Hexane	0.51
Toluene	0.28
Xylenes	0.28
Total HAPs	3.54
Carbon Dioxide Equivalent	3,001

REGULATORY APPLICABILITY

The following rules and regulations apply to this 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 heat input of all of the proposed fuel burning unit RBV-1 (0.2 MMBTU/hr) is below 10 MMBTU/hr. Therefore, this unit are exempt from the aforementioned sections of 45CSR2. However, RBV-1 is 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.

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 heat input of all of the proposed fuel burning unit RBV-1 (0.2 MMBTU/hr) are below 10 MMBTU/hr. Therefore, this unit 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. Therefore, Williams is required to submit a construction application. Williams has published the required Class I legal advertisement notifying the public of their permit application.

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 has one (1) storage vessel subject to 40CFR60 Subpart OOOO, and is therefore this facility is subject to 45CSR16.

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. Williams paid a $1,000 construction application fee and $1,000 NSPS fee. Since this facility has a total reciprocating engine capacity of less than 1,000 hp (384 hp) this facility is subject to 9M with an annual fee of $200.

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. Whipkey Station is a natural gas production facility that processes, upgrades, or stores natural gas prior to transmission. Whipkey 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."

As shown above, the maximum PTE of benzene emissions from the GDU process vent is 0.17 TPY. Therefore, the GDU is exempt from the Subpart HH requirements given under §63.764(d).

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

Engine CE-1 is an "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 manufactuer's date (DOM October 2000) of the engine.

Engine CE-1 due to the manufacturer's date of the engine must comply with the applicable emission limitations, operating limitations, and other requirements no later than October 19, 2013. Engine CE-1 is a two-stroke lean-burn at an area source of HAPs and is subject to Table 2d(6). Engine CE-1 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 it 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 (SO_2) 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 one (1) reciprocating compressor associated with CE-1 at this facility. This compressor will be delivered after to the effective date of this regulation. However this compressor was installed at a different facility prior to August 23, 2011 and this therefore this section of the regulation does not apply.

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.

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.

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.

Tank T01 will be contructed after August 23, 2011 and are affected facilities based on 40CFR60.5365(e). *Tank T01 located at this facility will emit less than 6 tpy of VOC (*40CFR60.5395) *without controls (2.45 tons/year) and therefore this section of this regulation is applicable. Recordkeeping requirements will be kept* [40CFR60.5420(b)(6)(ii) and 40CFR60.5420(c)(5)(ii)].

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

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

> 40CFR60.4230 states that a source that commenced construction after June 12, 2006 whose SI ICE was less than 500 hp and was manufactured on or after July 1, 2008 is subject to this rule. CE-1, based on engine manufacture date (October 2000) 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. Tanks T01 at this facility has proposed to install a 33.4 cubic meters volume tank. Therefore tank T01 would not be subject to this regulation.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

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

The acute toxicity of toluene is low. Toluene may cause eye, skin, and respiratory tract irritation. Short-term exposure to high concentrations of toluene (e.g., 600 ppm) may produce fatigue, dizziness, headaches, loss of coordination, nausea, and stupor; 10,000 ppm may cause death from respiratory failure. Ingestion of toluene may cause nausea and vomiting and central nervous system depression. Contact of liquid toluene with the eyes causes temporary irritation. Toluene is a skin irritant and may cause redness and pain when trapped beneath clothing or shoes; prolonged or repeated contact with toluene may result in dry and cracked skin. Because of its odor and irritant effects, toluene is regarded as having good warning properties. The chronic effects of exposure to toluene are much less severe than those of benzene. No carcinogenic effects were reported in animal studies. Equivocal results were obtained in studies to determine developmental effects in animals. Toluene was not observed to be mutagenic in standard studies.

The major use of toluene is as a mixture added to gasoline to improve octane ratings. Toluene is also used to produce benzene and as a solvent in paints, coatings, synthetic fragrances, adhesives,
inks, and cleaning agents. Toluene is also used in the production of polymers used to make nylon, plastic soda bottles, and polyurethanes and for pharmaceuticals, dyes, cosmetic nail products, and the synthesis of organic chemicals.

Xylenes

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.

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 this natural gas site should meet the applicable requirements. It is recommended that Williams's proposed Zein Station should be granted a 45CSR13 construction permit for their facility.

David Keatley
Permit Writer

Date