west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3085
Plant ID No.:	051-00167
Applicant:	Williams Ohio Valley Midstream LLC
Facility Name:	Caveney Compressor Station
Location:	Near Moundsville, Marshall County
NAICS Code:	213112
Application Type:	Construction
Received Date:	June 5, 2013
Engineer Assigned:	Joe Kessler
Fee Amount:	$4,500
Date Received:	June 11, 2013 ($2,000); July 10, 2013 ($2,500)
Complete Date:	July 18, 2013
Due Date:	October 16, 2013
Applicant's Ad Date:	June 4, 2013
Newspaper:	*Moundsville Daily Echo*
UTM's:	Easting: 527.249 km Northing: 4,415.794 km Zone: 17
Latitude/Longitude:	39.8918/-80.6813
Description:	Construction of a natural gas compressor station.

DESCRIPTION OF PROCESS

Williams Ohio Valley Midstream LLC (Williams) is proposing to construct a natural gas compressor station to be located in a rural area of Marshall County approximately 3.86 miles east-southeast of Moundsville, WV. The proposed Caveney Compressor Station will consist of one (1) Caterpillar G3306NA 4-Stroke Rich Burn (4SRB) 145 horsepower (hp) compressor engine, one (1) KW International 5.0 mmscf/day triethylene glycol (TEG) dehydration unit (GDU), and one (1) produced liquids storage tank.

Raw natural gas will enter into the facility and, after passing through an inlet separator to removed produced liquids, will be compressed by the engine. Produced water removed from the natural gas shall be directed to the 8,820 gallon storage tank (T01). Emissions from the storage tank (working/breathing/flashing) will not be controlled.

The engine (CE-01) is designed to compress the natural gas and send it through the GDU for dehydration and then into a gathering pipeline for transport. The engine proposed for the Caveney Compressor Station is uncontrolled.

Glycol dehydration is a liquid desiccant system used for the removal of water from natural gas. Lean, water-free glycol is fed to the top of an absorber (known as a "contactor") where it is contacted with the wet natural gas stream. The glycol removes water from the natural gas by physical absorption and is carried out the bottom of the column. The dry natural gas leaves the top of the absorption column and is fed into a pipeline for transportation.

After leaving the absorber, the glycol stream - now referred to as “rich” glycol - is fed to a flash vessel where a majority of the hydrocarbon vapors are removed and sent to the 0.2 mmBtu/hr reboiler (RBV-1) and used as a fuel (estimated to be 85%). The other 15% of flash tank off-gases are emitted uncontrolled into the atmosphere. It is estimated that combustion in the reboiler would, at a minimum, destroy 95% of the hydrocarbons in the off-gases. Any liquid hydrocarbons removed in the flash tank are sent to the storage tank. After leaving the flash vessel, the rich glycol is fed to the Glycol Regenerator Column. The Regenerator Column consists of a column, an overhead condenser, and the reboiler. The glycol is thermally regenerated to remove excess water and regain high purity. The hydrocarbons produced in the glycol regeneration process are uncontrolled and exhausted to the atmosphere.

The hot, lean glycol is cooled by the heat-exchanger and is then fed to a pump where it is sent to the glycol absorber for reuse. Liquids produced in the regeneration process are sent to the storage tank.

Additionally, the facility will utilize a truck loadout (TLO) to remove produced water from the site (estimated to be a maximum of 106,000 gallons/year).

SITE INSPECTION

On July 16, 2013, the writer conducted an inspection of the proposed location of the Caveney Compressor Station. The proposed Caveney site is located in a rural area of Marshall County approximately 3.86 miles east-southeast of Moundsville, WV off of County Route (CR) 34 (Middle Grave Creek Road). The writer was accompanied on the inspection by Ms. Danell Zawaski, Environmental Specialist with Williams. Observations from the inspection include:

- Currently located on the site is a (currently inactive) GDU constructed by Caimen. Williams has provided calculations showing this GDU is not defined as a stationary source;
- Co-located on the site of the proposed Caveney Station is an existing (also inactive) well and natural gas production facility owned and operated by Chevron Appalachia, LLC; and
- The nearest occupied dwelling located to the proposed site was approximately 0.25 miles north of the proposed site along the plant access road.

Directions: [Latitude: 39.8918, Longitude: -80.6813] Traveling southeast from Moundsville, WV

on Middle Grave Creek Road (CR34) turn left on Campbell Hill Road (CR 38) for 2.9 miles and take a right onto a road also called Middle Grave Creek Road (CR34 - also noted on some maps as a different road labeled CR34/1). Proceed for 0.6 miles to reach the site access road (on some maps listed as CR34/3) on the left which leads 0.4 miles to the plant boundary.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

Compressor Engines

Potential emissions from the Caterpillar G3306NA 4SRB 145 hp compressor engine (1E) were based emission factors provided by engine manufacturer, as given in AP-42, Section 3.2 (7/00), and provided in 40 CFR 98, Subpart C. Hourly emissions were based on the (as calculated using a fuel heat rating of 1,006 Btu/ft^3) maximum design heat input (MDHI) of the engine of 1.22 mmBtu/hr. Annual emissions were based on 8,760 hours of operation per year. The following table details the potential-to-emit (PTE) of the compressor engine:

Table 1: Compressor Engine PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
CO	1.42 g/hp-hr	Engine Vendor	0.45	1.99
NO_X	24.11 g/hp-hr	Engine Vendor	7.71	33.76
$PM_{2.5}$(1)	19.41 x 10^{-3} lb/mmBtu	AP-42, Table 3.2-3	0.02	0.10
PM_{10}(1)	19.41 x 10^{-3} lb/mmBtu	AP-42, Table 3.2-3	0.02	0.10
PM(1)	19.41 x 10^{-3} lb/mmBtu	AP-42, Table 3.2-3	0.02	0.10
SO_2	5.88 x 10^{-4} lb/mmBtu	AP-42, Table 3.2-3	~0.00	~0.00
VOCs	0.39 g/hp-hr	Engine Vendor	0.12	0.55
Total HAPs	Various	Engine Vendor AP-42, Table 3.2-3	0.08	0.37
Formaldehyde	0.23 g/hp-hr	Engine Vendor	0.07	0.32
CH_4	1.36 g/hp-hr	Engine Vendor	0.43	1.88
N_2O	1.0 x 10^{-4} kg/mmBtu	40 CFR Part 98, Subpart C, Table C-2	~0.00	~0.00
CO_2	511 g/hp-hr	Engine Vendor	163.35	715.48
CO_2e(3)	n/a	n/a	n/a	755.03

(1) Includes condensables.

(2) Based on multiplying the mass amount of emissions for each of the six greenhouse gases by the gas's associated global warming potential published at Table A-1 to Subpart A of 40 CFR Part 98 - Global Warming Potentials. Used to determine major source status of facilities under 45CSR14.

Glycol Regenerator Column

VOC, Hazardous Air Pollutant (HAP), and GHG (methane and CO_2) emissions from the glycol regenerator still vent (3E) are based on the emissions calculation program GRI-GLYCalc Version 4.0. GRI-GLYCalc is a well-known program for estimating air emissions from glycol units using triethylene glycol (TEG). Included in the application is a copy of the appropriate GLY-Calc analysis sheets. All emissions calculated by GRI-GLYCalc have been increased by a 20% safety factor to account for any future variability in input gas. As noted above, the GDU Still Vent is uncontrolled. The PTE of emissions generated by the glycol regenerator and the emission factor/emission factor source are given in the following table:

Table 2: GDU PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
VOC	**n/a**	**GLYCalc Results**	**4.81**	**21.08**
Hexane	*n/a*	*GLYCalc Results*	*0.06*	*0.26*
Benzene	*n/a*	*GLYCalc Results*	*0.13*	*0.55*
Toluene	*n.a*	*GLYCalc Results*	*0.58*	*2.54*
Ethyl-benzene	*n/a*	*GLYCalc Results*	*0.13*	*0.59*
Xylene	*n/a*	*GLYCalc Results*	*1.26*	*5.53*
		Total HAPs →	**2.16**	**9.47**
CH_4	n/a	GLYCalc Results	0.16	0.72
CO_2e	**n/a**	**n/a**	**n/a**	**15.13**

Dehydrator Flash Tank Off Gas

Uncontrolled VOC, Hazardous Air Pollutant (HAP), and GHG (methane and CO_2) emissions from the dehydrator flash tank off gases (3E) are based on the emissions calculation program GRI-GLYCalc Version 4.0. Included in the application is a copy of the appropriate GLY-Calc analysis sheets. As noted above, an estimated 85% of the uncontrolled emissions from the GDU Flash Tank are sent to the reboiler and used as a fuel (where it is expected that a minimum reboiler combustion efficiency of 95% would control the hydrocarbons) and the rest vented to atmosphere uncontrolled. Based on this, the expected aggregate control efficiency of the flash tank off gases would be 80.75% (1- (15% + 85%*(1-95%)). However, to be conservative, Williams used an aggregate control efficiency of 50% in GRI-GLYCalc to estimate the emissions from the flash tank. All emissions were then increased by a 20% safety factor to account for any future variability in input gas.

The aggregate PTE of emissions generated by the dehydrator flash tank off gases, as emitted from the reoboiler exhaust stack and directly to the atmosphere from the flash tank, and the emission factor/emission factor source are given in the following table:

Table 3: Dehydrator Flash Tank Off Gas PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
VOC	**n/a**	**GLYCalc Results**	**8.46**	**37.05**
Hexane	*n/a*	*GLYCalc Results*	*0.16*	*0.69*
Benzene	*n/a*	*GLYCalc Results*	*0.01*	*0.06*
Toluene	*n.a*	*GLYCalc Results*	*0.04*	*0.18*
Ethyl-benzene	*n/a*	*GLYCalc Results*	*0.01*	*0.02*
Xylene	*n/a*	*GLYCalc Results*	*0.04*	*0.17*
		Total HAPs ➜	**0.25**	**1.11**
CH_4	n/a	GLYCalc Results	12.68	55.52
CO_2e	**n/a**	**n/a**	**n/a**	**1,166.01**

Reboiler Combustion Exhaust Emissions

Combustion emissions from the 0.20 mmBtu/hr reboiler (2E) were based on the emission factors provided for natural gas combustion as given in AP-42 Section 1.4 and, for GHGs, on the emission factors provided under 40 CFR 98, Subpart C. Although the emission factors are given for natural gas combustion, they may be used for a reasonable estimation for the emissions from combustion of the GDU Flash Tank off gases. Hourly emissions were based on the MDHI of the unit (0.20 mmBtu/hr) and annual emissions were based on an annual operation of 8,760 hours. A natural gas heat content value of 1,020 Btu/ft^3 was used in the calculations.

The PTE generated by the reboiler's combustion exhaust and the emission factor/emission factor source are given in the following table:

Table 4: Reboiler Combustion Exhaust PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
NO_X	100 lb/mmscf	AP-42, Table 1.4-1	0.02	0.10
CO	84 lb/mmscf	AP-42, Table 1.4-1	0.02	0.08
CH_4	2.25 lb/mmscf	40 CFR Part 98, Subpart C, Table C-2	~0.00	~0.00
N_2O	0.22 lb/mmscf	40 CFR Part 98, Subpart C, Table C-2	~0.00	~0.00
CO_2	119,518 lb/mmscf	40 CFR Part 98, Subpart C, Table C-1	26.00	113.88
CO_2e	n/a	n/a	26.00	113.88

Storage Tanks

Uncontrolled VOC and Hazardous Air Pollutant (HAP) emissions from the produced water tank (4E) was calculated using EPA emission factors (working/breathing losses) as provided under document "EPA-450/3-85-001 - VOC Emissions from Petroleum Refinery Wastewater Systems" and using the ProMax Simulation Software (flashing losses). Annual emissions were based on a maximum throughput of 105,840 gallons/year.

ProMax software is chemical process simulator for design and modeling of amine gas treating and glycol dehydration units. Based on a detailed input gas analysis and the components of the facility, the software can simulate and model the inputs and outputs of the system. When run for Caveney (based on a gas sample taken at Caveney on October 1, 2009), it shows almost all the liquids produced at the facility will be water with little to no condensate. Based on this, only insignificant emissions would be expected from the storage tank. To provide a conservative estimate, Williams used an emission factor of 0.039 lb-VOC/bbl from the above EPA document for the working/breathing losses and a ProMax generated emission factor of 0.039 lb-VOC/bbl for the flashing losses.

Fugitives

Williams calculated four sources of fugitive emissions at the proposed Caveney Compressor Station: equipment leaks, maintenance and emergency events, and truck loadouts.

Equipment Leaks

Williams based their VOC and methane fugitive equipment leak calculations on emission factors taken from the document EPA-453/R-95-017 - "Protocol for Equipment Leak Emission Estimates" Table 2-4 (VOCs). No control efficiencies, as based on a Leak Detection and Repair (LDAR) protocol, was applied. Component counts were based, according to Williams, on the "default counts for compressor stations (GRI-GLYCalc)."

Startup, Shutdown and Maintenance Events

Williams also included in their fugitive emission estimate a certain number of scenarios where natural gas is released for emergency or maintenance purposes. Those included were compressor blowdowns (208 events/year) and cold-start engine startups (208 events/year). VOC and methane emissions from these events were based on conservative methane/VOCs/hexane/benzene percentages in the natural gas.

Truck Loadouts

Air emissions from produced water truck loading operations occur as fugitive emissions generated by displacement of vapors when loading trucks. The emission factor used to generate the VOC emissions is based on Equation (1) of AP-42 Section 5.2-4. In this equation, Williams used variables specific to the liquids loaded and to the method of loading - in this case "splash loading - dedicated normal service." Annual emissions were based on a maximum loading rate of 106,000 gallons/year of produced water. As no maximum hourly pumping rate was provided, hourly emissions were based on 1,000 hours of loading per year.

Emissions Summary

Based on the above estimation methodologies, which are determined to be reasonable, the PTE of the proposed Caveney Compressor Station is given in the following tables:

Table 5: Facility-Wide Aggregate Hourly (lb/hr) Criteria Pollutant PTE Summary.

Source	Emission Point	CO	NO_x	PM[1]	SO_2	VOCs	HAPs
Compressor Engine	1E	0.45	7.71	0.02	~0.00	0.12	0.08
GDU Still Vent	3E	0.00	0.00	0.00	0.00	4.81	2.16
GDU Flash Tank[2]	Reboiler	0.00	0.00	0.00	0.00	8.46	0.25
Combustion Exhaust		0.02	0.02	~0.00	~0.00	~0.00	~0.00
Storage Tanks	4E	0.00	0.00	0.00	0.00	0.02	0.01
Equipment Leaks	Fugitive	0.00	0.00	0.00	0.00	1.09	0.05
Plant Events[3]	Fugitive	0.00	0.00	0.00	0.00	n/a	n/a
Truck Loading	Fugitive	0.00	0.00	0.00	0.00	0.50	0.00
Facility-Wide Totals →		**0.47**	**7.73**	**0.02**	**0.00**	**15.00**	**2.55**

(1) All particulate matter emissions are assumed to be less than 2.5 microns and include condensables.
(2) This includes up to and estimated 15% of emissions direct to the atmosphere at the tank.
(3) These events will result in very large short-term emissions that occur very infrequently.

Table 6: Facility-Wide Aggregate Annual (ton/yr) Criteria Pollutant/GHG PTE Summary.

Source	Emission Point	CO	NO_x	PM[1]	SO_2	VOCs	HAPs	CO_2e
Compressor Engine	1E	1.99	33.76	0.10	~0.00	0.55	0.37	755
GDU Still Vent	3E	0.00	0.00	0.00	0.00	21.08	9.47	15
GDU Flash Tank[2]	Reboiler	0.00	0.00	0.00	0.00	37.05	1.11	1,166
Combustion Exhaust		0.10	0.08	~0.00	~0.00	~0.00	~0.00	114
Storage Tanks	4E	0.00	0.00	0.00	0.00	0.21	0.03	6
Equipment Leaks	Fugitive	0.00	0.00	0.00	0.00	4.76	0.24	333
Plant Events[3]	Fugitive	0.00	0.00	0.00	0.00	2.83	0.14	148
Truck Loading	Fugitive	0.00	0.00	0.00	0.00	0.25	0.06	0
Facility-Wide Totals →		**2.09**	**33.84**	**0.10**	**0.00**	**66.73**	**11.42**	**2,537**

(1) All particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.
(2) This includes up to and estimated 15% of emissions direct to the atmosphere at the tank.
(3) These events will result in very large short-term emissions that occur very infrequently.

Table 7: Facility-Wide Aggregate Annual (ton/yr) Speciated HAP PTE Summary[1]

Pollutant	ton/yr
Formaldehyde	0.32
Hexane	1.17
Benzene	0.67
Toluene	2.75
Xylene	5.79
Ethylbenzene	0.63
Other HAPs	0.10
Total HAPs	11.43

(1) As the PTE of all individual HAPs are less than 10 TPY and the PTE of total HAPs is less than 25 TPY, the proposed Caveney Compressor Station is defined as a minor (area) source of HAPs for purposes of 40 CFR 61, 40CFR63, and Title V.

REGULATORY APPLICABILITY

The proposed Caveney Compressor Station is subject to the following substantive state and federal air quality rules and regulations: 45CSR2, 45CSR13, 40 CFR 60 Subpart JJJJ, 40 CFR 63 Subpart HH, and 40 CFR 63, Subpart ZZZZ. Each applicable rule (and those that have questionable non-applicability) and Williams's compliance therewith will be discussed in detail below.

45CSR2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

Pursuant to the definition of "fuel burning unit" under 45CSR2 ("producing heat or power by indirect heat transfer"), 45CSR2 does not apply to the compressor engine.

The GDU Reboiler has been determined to meet the definition of a "fuel burning unit" under 45CSR2 and is, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of the GDU Reboiler is less than 10 mmBtu/hr, the unit is not subject to sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement is under Section 3.1 - Visible Emissions Standards.

Pursuant to 45CSR2, Section 3.1, the reboiler is subject to an opacity limit of 10%. Proper maintenance and operation of the reboiler (and the use of GDU Flash Tank off-gases/natural gas as fuel) should keep the opacity of the unit well below 10% during normal operations.

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides - (NON APPLICABILITY)

Pursuant to the definition of "fuel burning unit" under 45CSR10 ("producing heat or power by indirect heat transfer"), the limitations on fuel burning units under 45CSR10 do not apply to the compressor engine.

45CSR10 has requirements limiting SO_2 emissions from "fuel burning units," limiting in-

stack SO_2 concentrations of "manufacturing processes," and limiting H_2S concentrations in process gas streams. The only potential applicability of 45CSR10 to the Caveney Compressor Station is the limitations on fuel burning units. The GDU Reboiler has been determined to meet the definition of a "fuel burning unit" under 45CSR10. However, pursuant to the exemption given under §45-10-10.1, as the MDHI of the GDU Reboiler is less than 10 mmBtu/hr, the unit is not subject to the limitations on fuel burning units under 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

The proposed construction of the Caveney Compressor Station has a potential to emit in excess of six (6) lbs/hour and ten (10) TPY of a regulated pollutant and, therefore, pursuant to §45-13-2.24, the construction is defined as a "stationary source" under 45CSR13. Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction . . . and operation of any stationary source to be commenced without . . . obtaining a permit to construct." Therefore, Williams is required to obtain a permit under 45CSR13 for the construction and operation of the facility.

As required under §45-13-8.3 ("Notice Level A"), Williams placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The ad ran on June 4, 2013 in the *Moundsville Daily Echo* and the affidavit of publication for this legal advertisement was submitted prior to July 18, 2013.

45CSR14/45CSR19 (Non-Applicability)

The Caveney Compressor Station is proposed to be located in Marshall County, WV. Marshall County is classified as "in attainment" with all National Ambient Air Quality Standards except $PM_{2.5}$ and SO_2. Therefore, as the facility is not a "listed source" under §45-14-2.43, the individual major source applicability threshold for all pollutants except $PM_{2.5}$ NO_x (a defined precursor of $PM_{2.5}$) and SO_2 is 250 TPY (and pursuant to 2.80(e)(1), 100,000 TPY of CO_2e). Pursuant to §45-19-2.35, the major source applicability threshold for $PM_{2.5}$, NO_x, and SO_2 is 100 TPY. As given above in Table 6, the facility-wide PTE of the proposed Caveney Compressor Station is less than 100 TPY TPY for all criteria pollutants and less than 100,000 TPY of CO_2e. Therefore, the facility is not defined as a "major stationary source" under either 45CSR14 or 45CSR19 and the rules do not apply.

<u>Potential Source Aggregation</u>

Classifying multiple facilities as one "stationary source" under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of "Building, structure, facility, or installation" as given in §45-14-2.13 and §45-19-2.12. The definition states:

> "Building, Structure, Facility, or Installation" means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same "Major Group" (i.e.,

which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

As noted above, the proposed Caveney station is co-located on a site with a well-pad (and associated production facility) owned and operated by Chevron Appalachia, LLC. The application included an analysis of a potential "one-source" classification of the existing well-pad and the proposed compressor station. The Williams' analysis, determined to be reasonable by the DAQ, indicates that while the two facilities do belong to the same industrial grouping and are located on one or more contiguous or adjacent properties, the facilities are not under control of the same person (or persons under common control).

45CSR30: Requirements for Operating Permits - (NON APPLICABILITY)

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The proposed Caveney Compressor Station does not meet the definition of a "major source under §112 of the Clean Air Act" as outlined under §45-30-2.26 and clarified (fugitive policy) under 45CSR30b. The proposed facility-wide PTE of any regulated pollutant does not exceed 100 TPY (and, in the case of CO_2e, does not exceed 100,000 TPY). Additionally, the facility-wide PTE does not exceed 10 TPY of any individual HAP or 25 TPY of aggregate HAPs.

However, as the facility is subject to two New Source Performance Standard (NSPS) - 40 CFR 60, Subpart JJJJ and Subpart OOOO - and two Maximum Achievable Control Technology (MACT) rules - 40 CFR 63, Subpart ZZZZ and 40 CFR 63, Subpart HH, the facility would, in most cases, be subject to Title V as a "deferred source." However, pursuant to §60.4230(c), §60.5370(c), §63.6585(d), and §63.760(h) as a non-major "area source," Williams is not required to obtain a Title V permit for the proposed facility. Therefore, the Caveney Compressor Station is not subject to 45CSR30.

40 CFR 60, Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984 - (NON APPLICABILITY)

Pursuant to §60.110b, 40 CFR 60, Subpart Kb applies to "each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984." The storage tank proposed for the Caveney Compressor Station is 8,820 gallons, or 33 m^3. Therefore, Subpart Kb does not apply to the storage tanks.

40 CFR 60 Subpart JJJJ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.

Williams's Caterpillar G3306NA 4SRB 145 hp compressor engine proposed for the Caveney Compressor Station is defined under 40 CFR 60, Subpart JJJJ as stationary spark-ignition internal combustion engine (SI ICE) but is not, pursuant to §60.4230(a)(4)(iii), subject to the applicable provisions of the rule as the engine was manufactured, according to information provided in the permit application, on November 25, 1986.

40 CFR 60, Subpart OOOO: Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution - (NON APPLICABILITY)

On April 27, 2012, the USEPA issued a final rule (Federal Register Date: August 16, 2012) that consists of federal air standards for natural gas wells that are hydraulically fractured, along with requirements for several other sources of pollution in the oil and gas industry that currently are not regulated at the federal level. Each potentially applicable section of Subpart OOOO is discussed below.

Compressor Engines (NON APPLICABILITY)

Pursuant to §60.5365(c), "[e]ach 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" that commenced construction, modification or reconstruction after August 23, 2011 is subject to the applicable provisions of Subpart OOOO. As the compressor engine was manufactured prior to August 23, 2011 and is being relocated to Caveney (relocation is excluded from the definition of "modification" under §60.14(e)(6)), the engine is not subject to the requirements of OOOO.

Pneumatic Controllers (NON APPLICABILITY)

Pursuant to §60.5365(d)(2), "[f]or the natural gas production segment (between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not including natural gas processing plants), 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" that is constructed after August 23, 2011 is subject to the applicable provisions of Subpart OOOO. As the Caveney Compressor Station is located before the point of custody transfer, any pneumatic controllers that meet the above definition will be required to meet the substantive requirement for pneumatic controllers as given under §60.5390. However, Williams has stated that no pneumatic controllers will have a bleed rate in excess of 6 scfh.

Storage Tanks (non-applicability)

Pursuant to §60.5365(e), for "[e]ach 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" that is constructed after August 23, 2011 and, pursuant to §60.5395 has "VOC emissions equal to or greater than 6 tpy" must meet the control requirements under §60.5395 as of October 15, 2013. The substantive requirement is to "reduce VOC emissions by 95.0 percent or greater." The proposed produced water storage tank does not have VOC emissions greater than 6 TPY so the tank is not subject to the percent-reduction provisions of Subpart OOOO.

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. Pursuant to §63.760(a)(3), as the Caveney Compressor Station - an area source of HAPs (see Table 7) - "process[es], upgrade[s], or store[s] natural gas prior to the point at which natural gas enters the natural gas transmission and storage source category or is delivered to a final end user," it is defined as an area source subject to the applicable provisions under Subpart HH.

Pursuant to §63.760(b)(2), each TEG 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): if (1) "actual annual average flowrate of natural gas to the glycol dehydration unit is less than 85 thousand standard cubic meters [3 mmscf/day] per day" or (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 in Tables 2 and 3 above, the maximum PTE of benzene emissions from the GDU process vent is 0.61 TPY. Therefore, the GDU is exempt from the Subpart HH requirements given under §63.764(d) but must meet the compliance demonstration and record-keeping requirements under §63.772(b).

40 CFR 63 Subpart ZZZZ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

On June 1, 2013 the DAQ took delegation of the area source provisions of 40 CFR 63, Subpart ZZZZ. As the Caveney Compressor Station is defined as an areas source of HAPs (see Table 7), the facility is subject to applicable requirements of Subpart ZZZZ. Pursuant to §63.6603(a), "an existing stationary RICE located at an area source of HAP emissions . . . must comply with the requirements in Table 2d to this subpart and the operating limitations in Table 2b." Pursuant to §63.6590(a)(1)(iii), for a "stationary RICE located at an area source of HAP emissions, a stationary RICE is existing if [the owner or operator] commenced construction or reconstruction of the stationary RICE before June 12, 2006." Under §63.2, the definition of construction explicitly excludes the relocation of an affected source. Therefore, based on the above, the proposed engine at the Caveney Station is defined as an existing engine and must meet the applicable requirements under Tables 2b and 2d.

As Table 2d only includes requirements for existing diesel engines, the requirements applicable to the engine proposed for Caveney are located in Table 2d. Specifically, under Requirement 10, Caveney will be required to:

- Change oil and filter every 1,440 hours of operation or annually, whichever comes first;
- Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first, and replace as necessary; and
- Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the proposed Caveney Compressor Station and that are not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM_{10}), Particulate Matter less than 2.5 microns ($PM_{2.5}$), and Sulfur Dioxide (SO_2). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal and programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. As noted above, the proposed Caveney Compressor Station has the potential to emit the following HAPs: Hexane, Benzene, Toluene, Ethyl-benzene, Xylene, and Formaldehyde. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 9: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Ethyl-benzene	VOC	No	Category D - Not Classifiable
Xylene	VOC	No	Inadequate Data
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health affects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at *www.epa.gov/iris*.

AIR QUALITY IMPACT ANALYSIS

The estimated maximum emissions of the proposed facility are less than applicability thresholds that would define the proposed facility as "major" under 45CSR14 and, therefore, no air quality impacts modeling analysis was required. Additionally, based on the nature and location of the proposed source, an air quality impacts modeling analysis was not required under 45CSR13, Section 7.

MONITORING, COMPLIANCE DEMONSTRATIONS, REPORTING, AND RECORDING OF OPERATIONS

The following substantive monitoring, compliance demonstration, reporting, and record-keeping requirements (MRR) shall be required:

- For the purposes of demonstrating compliance with the maximum wet gas throughput limit set forth in 4.1.4. of the draft permit, Williams shall be required to monitor daily, monthly and rolling twelve month records of the wet gas throughput of the Glycol Dehydration Unit.

- In order to demonstrate compliance with 4.1.5(a)of the draft permit, upon request of the Director, Williams shall be required to demonstrate compliance with the VOC/HAP emissions thresholds using GLYCalc Version 4.0 or higher. Williams shall be required to sample in accordance with GPA Method 2166 and analyze the samples utilizing the extended GPA Method 2286 as specified in the GRI-GLYCalc V4 Technical Reference User Manual and Handbook.

- For the purposes of demonstrating compliance with visible emissions limitations set forth in 4.1.6(d) of the draft permit, Williams shall be required to:

    - Conduct an initial Method 22 visual emission observation on the Reboiler exhaust to determine the compliance with the visible emission provisions. Williams shall be required to take a minimum of two (2) hours of visual emissions observations on the units;

    - Conduct monthly Method 22 visible emission observations of the Reboiler exhaust to ensure proper operation for a minimum of ten (10) minutes each month the units are in operation;

    - In the event visible emissions are observed in excess of the limitations given under 4.1.6(d) of the draft permit, Williams shall be required to take immediate corrective action;

    - Maintain records of the visible emission opacity tests conducted per Section 4.2.3. of the draft permit; and

    - Any deviation(s) from the allowable visible emission requirement for any emission

source discovered during observations using 40CFR Part 60, Appendix A, Method 9 or 22 shall be reported in writing to the Director of the Division of Air Quality as soon as practicable, but in any case within ten (10) calendar days of the occurrence and shall include at least the following information: the results of the visible determination of opacity of emissions, the cause or suspected cause of the violation(s), and any corrective measures taken or planned.

- For the purposes of demonstrating compliance with the Reboiler fueling requirements set forth in 4.1.5(c) of the draft permit, Williams shall be required to monitor and record the twelve month rolling amount of GDU Flash Tank off-gases sent to the Reboiler as fuel;

- For the purposes of demonstrating compliance with the truck loadout throughput limit set forth in 4.1.10(b) of the draft permit, Williams shall be required to monitor and maintain monthly and rolling twelve month records of the amount of liquids loaded out; and

- Williams shall be required to meet all applicable Monitoring, Compliance Demonstration and Source-Specific Recordkeeping and Reporting Requirements as given under 45CSR2, 40 CFR 63, Subpart HH, and Subpart ZZZZ.

PERFORMANCE TESTING OF OPERATIONS

The following substantive performance testing requirements shall be required:

- At such reasonable time(s) as the Secretary may designate, in accordance with the provisions of 3.3 of the draft permit, Williams shall be required to conduct or have conducted test(s) to determine compliance with the emission limitations established in this permit and/or applicable regulations.

- Williams shall be required to meet all applicable Performance Testing Requirements as given under 45CSR2, 40 CFR 63, Subpart HH, and Subpart ZZZZ..

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of a Permit Number R13-3085 to Williams Ohio Valley Midstream LLC for the proposed construction and operation of the Caveney Compressor Station located near Moundsville, Marshall County, WV.

Joe Kessler, PE
Engineer

Date