west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3261
Plant ID No.:	103-00106
Applicant:	Williams Ohio Valley Midstream
Facility Name:	Dewhurst Dehydration Station
Location:	Wetzel County
NAICS Code:	213112
Application Type:	Construction
Received Date:	July 29, 2015
Engineer Assigned:	Joe Kessler
Fee Amount:	$3,500
Date Received:	July 31, 2015
Complete Date:	August 28, 2015
Due Date:	November 25, 2015
Applicant Ad Date:	July 28, 2015
Newspaper:	*Moundsville Daily Echo*
UTM's:	Easting: 532.23 km Northing: 4,369.46 km Zone: 17
Latitude/Longitude:	39.47400/-80.62500
Description:	Permit for after-the-fact construction and operation of a 12.5 mmscf/day Glycol Dehydration Unit (GDU), produced water storage tanks, and associated truck loadout.

Entire Document
NON-CONFIDENTIAL

DESCRIPTION OF PROCESS

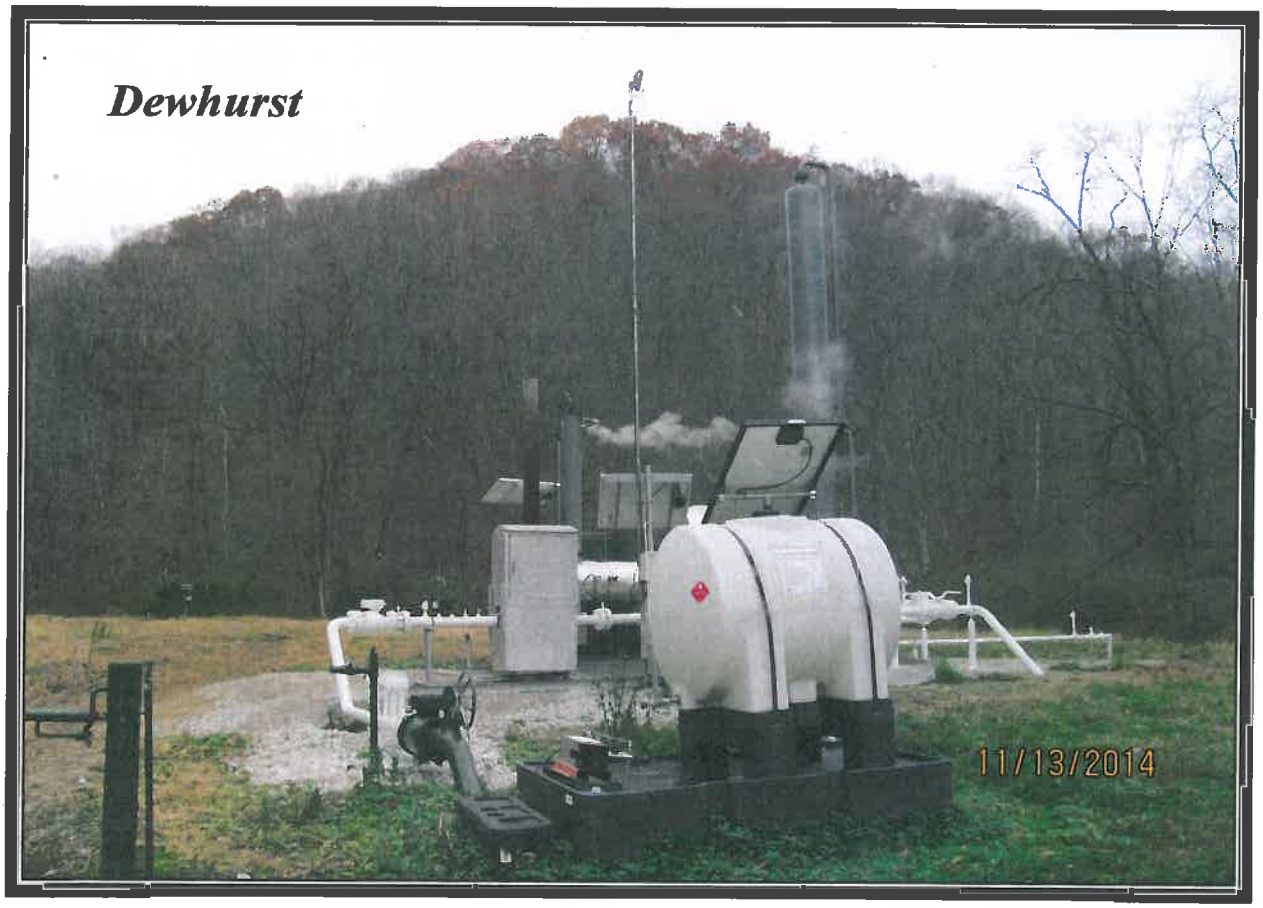
Williams Ohio Valley Midstream (OVM) has submitted a permit application for the after-the-fact construction and operation of a 12.5 mmscf/day triethylene glycol (TEG) GDU (including produced water storage tanks an associated truck loadout) located approximately 4.1 miles south-southeast of Jacksonburg, Wetzel County, WV. The facility began operation in 2013.

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 tower") 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 further processing or transportation.

After leaving the absorber, the glycol stream - now referred to as "rich" glycol - is fed to a flash vessel (DFT-01) where a minimum of 50% of the hydrocarbon vapors are removed and used in the reboiler as a fuel. Any excess flash tank off gas is released to the atmosphere. Any liquid hydrocarbons produced in the flash tank are skimmed from the glycol. After leaving the flash vessel, the rich glycol is heated in a heat-exchanger and fed to the glycol regenerator column. The regenerator column consists of a column, an overhead condenser, and a 0.30 mmBtu/hr gas-fired reboiler (RBV-01, 3E). The glycol is thermally regenerated to remove excess water and regain the high purity. The hydrocarbons produced in the glycol regenerator process (DSV-01) are uncontrolled and released to the atmosphere (2E). 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. The facility also includes one (1) 8,820 gallon produced water storage tank (T-01) and a 105,840 gallons/year produced water truck loadout (TLO).

SITE INSPECTION

On September 9, 2013 and November 13, 2014, Mr. James Jarrett of the DAQ Compliance/Enforcement Section conducted an inspection of the Dewhurst facility. The facility is located at the terminus of County Route (CR) 8/2 (Buffalo Run Road) approximately 4.1 miles south-southeast of Jacksonburg, Wetzel County, WV. The location is very rural in nature, with the nearest occupied residence located approximately (as based on Google Earth) 1.24 miles to the northeast along CR 8/2. Attached is a picture of the facility taken on November 13, 2014.



Directions: [Latitude: 39.47400, Longitude: -80.62500] From the junction of WV State Route (SR) 20 (Galmish Road) and CR 8/2 (Buffalo Run Road) in Jacksonburg, travel south on CR 8/2 for approximately 4.9 miles to the site at the terminus of CR 8/2.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

Glycol Regenerator Column/GDU Flash Tank Emissions

Uncontrolled VOC and Hazardous Air Pollutant (HAP) emissions from the glycol regenerator and GDU flash tank 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 TEG. Included in the application is a copy of the appropriate GLY-Calc analysis sheets. A site-specific gas analysis taken on July 2, 2013 was used to provide inputs to GLY-Calc and was included in the permit application. A 50% flash tank recycle rate was used in the calculations.

Reboiler Exhaust Emissions

Combustion exhaust emissions from the 0.30 mmBtu/hr reboiler (S002) were based on the emission factors provided for natural gas combustion as given in AP-42 Section 1.4. (AP-42 is a database of emission factors maintained by USEPA). Hourly emissions were based on the maximum design heat input (MDHI) of the unit (0.30 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.

Storage Tanks

Air emissions from produced water storage tank (4E) were based on VOC/HAP emission factors taken from the document EPA-450/3-85-001a – "Volatile Organic Compound Emissions from Petroleum Refinery Wastewater Systems - Background Information for Proposed Standards" (for working/breathing losses) and based on ProMax Simulation Software. ProMax software is chemical process simulator for design and modeling of amine gas treating, glycol dehydration units, and other natural gas components. Based on a detailed input gas analysis and the components of the facility, the software can simulate and model the inputs and outputs of a facility. It is noted that any VOC/HAP emissions from produced water storage tanks is expected to be minimal as these constituents are not expected to be present in large percentages.

Truck Loadout

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 5.2-1. In this equation, OVM used variables specific to the liquids loaded and to the method of loading - in this case "splash loading." Additionally, worst-case annual emissions were based on a maximum loading rate of 106,000 gal/year of produced-water. As no maximum hourly pumping rate was provided, hourly emissions were based on 100 hours of loading per year. It is noted that any VOC/HAP emissions from a

produced water loadout is expected to be minimal as these constituents are not expected to be present in large percentages.

Fugitives

OVM based their fugitive equipment leak calculations on emission factors taken from the document EPA-453/R-95-017 - "Protocol for Equipment Leak Emission Estimates." Emission factors were taken from Table 2-4 and no control efficiency, as based on a Leak Detection and Repair (LDAR) protocol, was applied.

Emissions Summary

The aggregate emissions associated with the Dewhurst Dehydration Station is given in the following tables:

Table 1: Facility-Wide Aggregate Hourly (lb/hr) Criteria Pollutant PTE Summary.

Source	CO	NO_x	PM(1)	SO_2	VOCs	HAPs
GDU Still Vent/Flash Tank	0.00	0.00	0.00	0.00	3.55	2.08
Reboiler	0.02	0.03	~0.00	~0.00	~0.00	~0.00
Storage Tank	0.00	0.00	0.00	0.00	0.02	<0.01
Truck Loadout	0.00	0.00	0.00	0.00	1.60	0.20
Equipment Leaks	0.00	0.00	0.00	0.00	1.02	0.00
Facility-Wide Totals →	**0.02**	**0.03**	**0.00**	**0.00**	**6.19**	**2.29**

(1) Conservatively, all particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.

Table 2: Facility-Wide Aggregate Annual (ton/yr) Criteria Pollutant PTE Summary.

Source	CO	NO_x	PM(1)	SO_2	VOCs	HAPs
GDU Still Vent/Flash Tank	0.00	0.00	0.00	0.00	15.53	9.12
Reboiler	0.11	0.13	~0.00	~0.00	~0.00	~0.00
Storage Tank	0.00	0.00	0.00	0.00	0.07	0.01
Truck Loadout	0.00	0.00	0.00	0.00	0.08	0.01
Equipment Leaks	0.00	0.00	0.00	0.00	4.45	0.28
Facility-Wide Totals →	**0.11**	**0.13**	**0.00**	**0.00**	**20.13**	**9.42**

(1) Conservatively, all particulate matter emissions are assumed to be less than 2.5 microns. Includes condensables.

REGULATORY APPLICABILITY

This section will address the potential regulatory applicability/non-applicability of substantive state and federal air quality rules relevant to the Dewhurst Dehydration Station.

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

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 natural gas and flash tank off-gases 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)

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 Dewhurst Dehydration 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 Dewhurst Dehydration Station has a maximum emission rate of a regulated pollutant (VOCs in this case) in excess of six (6) lbs/hour and ten (10) TPY (see Table 2 above) and, therefore, pursuant to §45-13-2.24, the facility 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, OVM is required to obtain a permit under 45CSR13 for the construction and operation of the natural gas production facility.

As required under §45-13-8.3 ("Notice Level A"), OVM placed a Class I legal advertisement in a "newspaper of *general circulation* in the area where the source is . . . located." The ad ran on July 28, 2015 in the *Moundsville Daily Echo* and the affidavit of publication for this legal advertisement was submitted on August 6, 2015.

<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 Dewhurst Dehydration Station is co-located on a site with a well-pad (and associated production facility) owned and operated by Trans Energy, Inc. The application included an analysis of a potential "one-source" classification of the existing well-pad and the dehydration 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).

45CSR14 (NON APPLICABILITY)

The facility-wide PTE of the Dewhurst Dehydration Station (see Table 2 above) is below the levels that would define the source as "major" under 45CSR14 and, therefore, the construction evaluated herein is not subject to the provisions of 45CSR14.

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 facility 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. Therefore, the Dewhurst Dehydration Station is not subject to 45CSR30. However, as the facility is subject to a Maximum Achievable Control Technology (MACT) rule - 40 CFR 63, Subpart HH - the facility would, in most cases, be subject to Title V as a "deferred source." Pursuant to §63.760(h), as a non-major "area source," OVM is not required to obtain a Title V permit for the proposed facility. Therefore, the Dewhurst Dehydration Station is not subject to 45CSR30.

40 CFR 63 Subpart HH: National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities (NON-DELEGATION)

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 Dewhurst Dehydration Station - an area source of HAPs (see Table 2) - "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."

Pursuant to information in the permit application, the maximum aggregate PTE of benzene emissions from the GDU process vent is 0.33 TPY. Therefore, the GDU is exempt from the Subpart HH requirements given under §63.764(d). However, pursuant to §63.760(c), "[a]ny source that has actual emissions of 5 tons per year or more of a single HAP, or 12.5 tons per year or more of a combination of HAP (i.e., 50 percent of the major source thresholds), shall update its major source determination within 1 year of the prior determination or October 15, 2012, whichever is later, and each year thereafter, using gas composition data measured during the preceding 12 months." As shown in Table 2, OVM exceeds these thresholds and will have to update its major source status on an annual basis.

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

The Dewhurst Dehydration Station does not include any gas wells, compressor engines, pneumatic controllers, or storage tanks with a PTE of 6 TPY. Therefore, the facility is not subject to any substantive provision of 40 CFR 60, Subpart OOOO.

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the Dewhurst Dehydration 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 (with the exception of PM) 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. The Dewhurst Dehydration Station has the potential to emit the following HAPs in substantive amounts: n-Hexane, Benzene, Toluene, Ethyl-benzene, and Xylene. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 3: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
n-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

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 construction does not meet the definition of a "major stationary source" pursuant to 45CSR14 and, therefore, an air quality impact (computer modeling) analysis was not required. Additionally, based on the nature of the construction , modeling was not required under 45CSR13, Section 7.

MONITORING, COMPLIANCE DEMONSTRATIONS, RECORD-KEEPING, AND REPORTING REQUIREMENTS

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

- For the purposes of demonstrating compliance with the maximum dry gas throughput limit set forth in 4.1.2(a) of the draft permit, OVM shall be required to monitor and maintain monthly and rolling twelve month records of the dry gas throughput of the Glycol Dehydration Unit.

- Compliance with the Maximum Glycol Recirculation Limitation set forth in 4.1.2(b) of the draft permit shall be determined using an average of a minimum of quarterly readings of the actual glycol pump(s) rate. If more than one pump is operating simultaneously then the rate of each operating pump shall be recorded and totaled for compliance purposes.

- For the purposes of demonstrating compliance with visible emissions limitations set forth in, OVM shall be required to, at such reasonable times as the Secretary may designate, conduct

Method 9 emission observations for the purpose of demonstrating compliance with section 4.1.3(d) of the draft permit. Method 9 shall be conducted in accordance with 40 CFR 60 Appendix A.

- For the purposes of demonstrating compliance with the maximum truck loadout limits set forth in 4.1.4 of the draft permit, OVM shall be required to monitor and record the monthly and rolling twelve month amount of produced water loaded into trucks.

Additionally, MRR consistent with the Subpart HH requirements relating to the annual major source status update will be required.

PERFORMANCE TESTING OF OPERATIONS

The following substantive performance testing requirements shall be required:

- With respect to any wet gas sampling, OVM shall be required to sample wet natural gas in accordance with the Gas Processor Association (GPA) Method 2166 and analyze the samples in accordance with GPA Method 2286. The permittee may utilize other equivalent methods provided they are approved in advance by DAQ as part of a testing protocol. If alternative methods are proposed, a test protocol shall be submitted for approval no later than 60 days before the scheduled test date.

RECOMMENDATION TO DIRECTOR

The information provided in permit application R13-3261 indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of Permit Number R13-3261 to Williams Ohio Valley Midstream for the after-the-fact construction and operation of the Dewhurst Dehydration Station located near Jacksonburg, Wetzel County, WV.

Joe Kessler, PE
Engineer

10/30/15
Date