



west virginia department of environmental protection

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ENGINEERING EVALUATION/FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2826J
Plant ID No.:	051-00127
Applicant:	Williams Ohio Valley Midstream, LLC
Facility Name:	Ft. Beeler Natural Gas Processing Facility
Location:	Near Moundsville, Marshall County
SIC/NAICS Code:	1321/211112
Application Type:	Modification
Received Date:	December 23, 2015
Engineer Assigned:	Joe Kessler
Fee Amount:	\$2,000
Date Received:	December 30, 2015
Complete Date:	January 21, 2016
Due Date:	April 20, 2016
Applicant Ad Date:	December 28, 2015
Newspaper:	<i>Moundsville Daily Echo</i>
UTM's:	Easting: 535.0 km Northing: 4,414.35 km Zone: 17
Latitude/Longitude:	39.8783/-80.5907
Description:	Modification to make various changes at the facility including (1) increasing the annual amount of waste-gases combusted in both the "old" and "new" flares, (2) re-calculating facility-wide fugitive emissions based on updated gas analysis data, and (3) improving the calculation of speciated Hazardous Air Pollutant (HAP) emissions using updated protocols.

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On March 29, 2010, Permit Number R13-2826 was issued to Caiman Eastern Midstream, LLC (CEM) for the construction and operation of the Ft. Beeler Gas Processing Facility. The plant was originally constructed to receive natural gas from local production wells and then filter and process it through a Joule-Thompson cooling unit (J-T Skid) to remove non-methane/ethane organics from the gas stream. Since that time, the facility has been the subject of many additional permitting actions. Additionally, on May 15, 2012, CEM changed its name to Williams Ohio Valley Midstream, LLC (OVM). The following table provides a brief description of each of the previous actions:

Table 1: Previous Permitting Actions - Ft. Beeler Natural Gas Processing Facility

Permit#	Action Date	Description
R13-2826	3/29/2010	Construction Permit issued for the installation of four (4) engines, one (1) hot oil heater, one (1) truck loading station, two (2) condensate tanks, and one (1) Joule-Thompson (J-T) Skid.
R13-2826A	8/17/10	Application Withdrawn.
R13-2826B	10/29/10	Modification permit issued for the removal of one (1) compressor engine and temporary equipment, and installation of new condensate tanks, a methanol tank, five (5) new compressor engines, a hot oil heater, a cryogenic unit, a regenerator heater, and truck loading.
R13-2826C	6/30/11	Application Withdrawn.
R13-2826D	8/09/11	Modification permit issued for the removal of two (2) natural gas compressor engines, and installation of two (2) natural gas fired heaters and a second cryogenic unit which will increase the natural gas processing capacity to 200 mmcf/day.
R13-2826E	1/30/12	Modification permit issued to increase in the size and hours of operation of the medium heater (23S), and installation a flare for management of gas during certain anticipated maintenance activities. The hot oil heater (5S) was removed from operation.
R13-2826F	5/02/12	Modification permit issued for the installation of a third cryogenic plant. In addition, two (2) compressor engines (2S, 4S) and the J-T Skid (9S) were removed from operation.
R13-2826G	12/17/12	Modification permit issued for the removal from service of a compressor engine (12S); reactivation of a compressor engine (previously designated as 4S); decrease of fuel usage limits on compressor engines 18S, 19S, and 20S; increase of Maximum Design Heat Inputs (MDHIs) on process heaters (14S, 21S, 22S, 23S, 29S, and 30S), addition of a new condensate stabilizer heater (31S), and increase of flare (27S) purge-gas throughput.
R13-2826H	12/03/14	Modification permit issued for the installation of one (1) new process flare (FL-02) and one (1) emergency generator engine (GE-01). This modification also removed the condensate stabilizer heater, removed run time restrictions on compressor engines (CE-03 – CE-05), removed run time restrictions on the regen gas heaters (H-03, H04) and incorporates new emission estimating protocols.
R13-3212	12/16/14	Construction permit of a natural gas dehydration unit that is co-located with the Fort Beeler Processing Facility.
R13-2826I	8/02/15	Class I Administrative Update to correct capacity of storage tank T-02 (from 8,400 gallons to 8,820 gallons) and revised installation dates for storage tanks T-03 and T-04. No change in emissions as a result of these actions.

DESCRIPTION OF PROCESS/MODIFICATIONS***Existing Facility***

The Fort Beeler Gas Processing Plant currently receives natural gas from local production wells and processes this gas through cryogenic processes, removing natural gas liquids (NGL) from the

inlet gas. The facility has the capacity to process 520 mmscf/day of raw natural gas through one (1) 120 mmscf/day cryogenic plant (Plant 1) and two (2) 200 mmscf/day cryogenic plants (Plant 2 and Plant 3).

The cryogenic process effects the removal of natural gas liquids by lowering the temperature of the inlet gas to approximately -120° Fahrenheit. Use of an expansion turbine is then used to rapidly expand the chilled gases, causing the temperature to drop even further. This rapid temperature drop condenses much of the ethane (C₂H₆) and most of the other hydrocarbons (primarily propane (C₃H₈) and butane (C₄H₁₀), with de-minimis amounts of hexane, benzene, toluene, ethyl-benzene, xylene, etc. (together C5+)), while maintaining methane (CH₄) in a gaseous form. As this is a totally enclosed system, the only emissions are fugitives from piping and equipment leak losses. These emissions are mitigated by implementation of a leak detection and repair (LDAR) program.

Five (5) gas-fueled compressor engines are currently permitted for use in the plant processes. Each of the engines is equipped with emission control technology applicable to the operation. The rich-burn engines (CE-01 and CE-02) utilize non-selective catalytic reduction (NSCR) and the lean-burn engines (CE-03 through CE-05) utilize catalytic oxidation (also known as oxidation catalyst or OxCat).

Two (2) process flares are used at the facility to safely combust natural gas and NGL during routine operation. The old process flare (FL-01) is primarily used to combust natural gas released during general maintenance activities (e.g., blowdowns of the six electrically driven residue gas compressors). The new process flare (FL-02) is used to combust natural gas and NGL released from numerous process sources. The top five non-emergency streams routed to the vents to the new process flare include the TXP1 Inlet Gas Separator (V-410), TXP2 Product Surge Tank (V-2404), TXP1 Product Surge Tank (V-404), TXP1 Cold Separator (V-402) and TXP1 Inlet Filter (F-441). The new process flare (FL-02/18E) is also be used to control emissions in the event of an upset. Each flare has a minimum hydrocarbon destruction and removal efficiency (DRE) of 98%.

Six (6) gas-fueled heaters are used at the existing facility. The Regen Heaters (H-02 through H-04) are used to regenerate the mole-sieves necessary to further dry the Inlet Gas and the Hot Oil Heater (H-01) and Medium Heaters (H-05 and H-06) are used on the NGL de-methanizers.

One (1) small 5mmscf/day triethylene glycol (TEG) dehydration unit is located at the facility to dehydrate a portion of the inlet gas coming into the facility. While this dehydration unit is located at the Ft. Beeler facility, it is permitted under R13-3212.

Additionally, the existing facility utilizes various NGL, process and waste storage tanks. A truck loading rack is also used to remove produces water and condensate from the site. An emergency generator (GE-01) is located on site to provide electrical power for various activities in the event of the loss of power.

Proposed Modifications

OVM is now proposing to modify the existing facility by:

- Increasing the amount of annual permitted waste gases sent to the old flare (FL-01) from 5.0 mmscf/yr to 25.0 mmscf/yr;
- Increasing the amount of annual permitted waste gases sent to the new flare (FL-02) from 59.21 mmscf/yr to 90.00 mmscf/yr; and
- Revising the potential fugitive emissions generated at the facility based on updated gas analysis data, and updated protocols for determining the emissions of speciated Hazardous Air Pollutants (HAP).

SITE INSPECTION

Due to the nature of the source and the proposed changes, the writer deemed a site inspection as not necessary. The facility was last "FullOnSite" inspected by DAQ Compliance/ Enforcement (C/E) Inspector Mr. Steven Sobotka on September 17, 2013. Based on that inspection, the facility was determined to be "Status 30 - In Compliance."

AIR EMISSIONS AND CALCULATION METHODOLOGIES

OVM included in Attachment N of the permit application detailed facility-wide emissions calculations (revised based on the proposed modifications noted above). The following will only summarize the air emissions and calculation methodologies of the emission sources being modified as part of this permitting action.

Flares

Two sources of air emissions occur at the flares (17E and 18E): VOC/HAP emissions that pass-through the flare uncombusted and the products of combusting the organic vapors sent to the flares for destruction. The combustion emissions from flaring are based on, where appropriate, emission factors obtained from sections of AP-42 (Section 13.5: NO_x and CO, Section 1.4: SO₂, particulate matter, and some speciated HAPs). AP-42 is a database of emission factors maintained by USEPA. Pass-through hydrocarbon emissions are based on mass balance calculations using constituent gas properties obtained from a gas analysis (VOCs, Total HAPs, CH₄). A 98% DRE was applied to the uncontrolled emissions of organic compounds to determine VOC/HAP emissions. Hourly emissions were based on the maximum heat input combustion rate of each flare (in mmBtu/hr). Annual emissions were based on flaring a maximum of 25.0 mmscf/yr and 90.0 mmscf/yr of waste gas in the old and new flare, respectively. A waste gas higher-heating value (HHV) of 1,126 Btu/scf (old flare) and 1,290 Btu/scf (new flare) were used in the calculations.

Fugitive Emissions

Process and Piping Components

OVM based their uncontrolled recalculated fugitive process and piping components leak calculations (E) 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 controlled emissions from various sources (valves and connectors) were based on the Table 5-2 and the use of a Leak Detection and Repair (LDAR) protocol that meets the minimum requirement of a 10,000 ppm, leak definition and monthly monitoring (where applicable). VOC emissions were based on light liquid (100% by weight) and gas (39.95% by weight) VOC contents. HAP emissions were based on the estimated speciated weight percentages of the HAPs in the applicable streams. Component counts were based on actual counts and design estimates.

Other Equipment Leaks

OVM estimated fugitive leaks of natural gas from other potential sources such as leaks from the both compressors' engine rod packing and crankcases (7E). VOC/HAP emissions were based upon vendor data and representative gas analysis.

Startup/Shutdown/Maintenance

OVM also included in their fugitive emission estimate a certain number of scenarios where natural gas/propane is released for emergency or maintenance purposes (6E). Those included were compressor blowdown/startup events and engine cold starts. Gas released per each event were based on engineering estimates. VOC/HAP by-weight percentages of the natural gas/propane were based on actual gas analysis data with a conservative safety factor.

Emissions Summary

Based on the calculations submitted in Attachment N of the permit application, the revised post-modification facility-wide PTE and the change in PTE as a result of the proposed modification of the Ft. Beeler Natural Gas Processing Facility is given in the following table:

Table 2: Change in Facility-Wide Annual PTE (in tons/year)

Pollutant	R13-2826I ⁽¹⁾	R13-2826J	Change
CO	86.14	93.51	7.37
NO _x	91.25	93.40	2.15
PM _{2.5} /PM ₁₀ /PM	6.96	7.20	0.24
SO ₂	0.45	0.47	0.02
VOCs	153.61	178.79	25.18
Total HAPs	21.78	23.96	2.18

(1) Emissions taken from R13-2826H Engineering Evaluation/Fact Sheet.

REGULATORY APPLICABILITY

This section will address the potential regulatory applicability/non-applicability of substantive state and federal air quality rules relevant to the emission units/sources proposed to be modified at the Ft. Beeler Natural Gas Processing Facility.

45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse

OVM's flares are each defined as an "incinerator" under 45CSR6 and are, therefore, subject to the requirements therein. The substantive requirements applicable to the units are discussed below.

45CSR6 Emission Standards for Incinerators - Section 4.1

Section 4.1 limits PM emissions from incinerators to a value determined by the following formula:

$$\text{Emissions (lb/hr)} = F \times \text{Incinerator Capacity (tons/hr)}$$

Where, the factor, F, is as indicated in Table I below:

Table I: Factor, F, for Determining Maximum Allowable Particulate Emissions

<u>Incinerator Capacity</u>	<u>Factor F</u>
A. Less than 15,000 lbs/hr	5.43
B. 15,000 lbs/hr or greater	2.72

For the old flare (FL-01), based on: (1) the flare's maximum heat input rating of 240 mmBtu/hr, (2) the worst-case HHV of the waste gas of 1,126 Btu/scf, and (3) the inlet gas mass of 55,500 lb/mmscf (taken from the gas analysis), the maximum flare capacity can be calculated to be 11,829 lb/hr (or 5.91 tons/hour). Based on this calculated flare capacity, the particulate matter emission limit given under the above equation is 32.12 lb/hr. The worst-case particulate matter rate from the old flare was calculated to be 1.79 lb/hr, or 5.57% of the Rule 6 emission limit.

For the new flare (FL-02), based on the flare's maximum capacity from the manufacturer, the capacity is 383,000 lb/hr (191.5 tons/hour). Based on this, the particulate matter emission limit given under the above equation is 520.88 lb/hr. The worst-case particulate matter rate from the flare was calculated to be 4.04 lb/hr, or less than 1% of the Rule 6 emission limit.

45CSR6 Opacity Limits for - Section 4.3, 4.4

Pursuant to Section 4.3, and subject to the exemptions under 4.4, each flare has a 20% limit on opacity during operation. Proper design and operation of the flares should prevent any substantive opacity from the units.

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 changes to the Ft. Beeler Natural Gas Processing Facility have the potential to increase the PTE of the facility in excess of six (6) lbs/hour and ten (10) TPY of a regulated pollutant (see Table 2 above) and, therefore, pursuant to §45-13-2.17, the changes are defined as a "modification" under 45CSR13. Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction, modification, relocation 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 modification of the 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 December 28, 2015 in *Moundsville Daily Echo* and the affidavit of publication for this legal advertisement was submitted on January 8, 2016.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration - (NON APPLICABILITY)

The Ft. Beeler Natural Gas Processing Facility is located in Marshall County, WV. Marshall County is classified as "in attainment" with all National Ambient Air Quality Standards (NAAQS) except for, in certain tax districts, SO₂. The Ft. Beeler facility is not located in a tax district that is classified as "non-attainment" for SO₂. Therefore, applicability to major New Source Review (NSR) for all pollutants is determined under 45CSR14.

As the facility is not a "listed source" under §45-14-2.43, the individual major source applicability threshold for all criteria pollutants is 250 TPY. As given above in Table 2, the facility-wide post-modification PTE of the Ft. Beeler Natural Gas Processing Facility is less than 250 TPY for all criteria pollutants. Therefore, the facility is not defined as a "major stationary source" under 45CSR14.

It is also important to note that the facility does not contain a "nested" major stationary source - in this case a secondary listed source: "Fossil Fuel Boilers (or combinations thereof) Totaling More than 250 Million Btu/hour Heat Input." All the natural-gas fired heaters would contribute to this 250 mmBtu/hr threshold. However, the aggregate MDHI of all the heaters is 70.38 mmBtu/hr. Therefore, no "nested" source is located at the Ft. Beeler Natural Gas Processing Facility.

45CSR30: Requirements for Operating Permits

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 Ft. Beeler Natural Gas Processing Facility, defined under Title V as a "major source," was last issued a Title V renewal permit on October 9, 2015 (R30-05100127-2015). Proposed changes evaluated herein must also be incorporated into the facility's Title V operating permit. Commencement of the operations authorized by this permit shall be determined by the appropriate timing limitations associated with Title V permit revisions per 45CSR30.

40CFR60 Subpart KKK: Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants - (NON APPLICABILITY)

Subpart KKK applies to onshore natural gas processing plants that commenced construction after January 20, 1984. The Fort Beeler Station is subject to this rule due to the three (3) cryogenic plants located at the facility. OVM must meet the Leak Detection and Repair (LDAR) requirements of Subpart KKK, which includes the provisions referenced in 40 CFR 60, Subpart VV. Substantively, Subpart VV defines a leak (and triggers repair procedures) when pollutant concentrations are detected in excess of 10,000 ppmv. However, it is noted, based on the applicability dates that the Inlet and TXP3 processing train are subject to the LDAR requirements of 40 CFR 60, Subpart OOOO (see below).

40 CFR 60, Subpart OOOO: Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

On April 27, 2012, the USEPA issued a final rule (with amendments finalized on 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 were previously not regulated at the federal level. Each section of Subpart OOOO potentially applicable to a new or modified source is discussed below.

Leak Detection and Repair Requirements (LDAR)

The substantive requirement for affected facilities at a natural gas processing plant is to meet the applicable LDAR conditions under Subpart VVa. The Ft. Beeler Natural Gas Processing Facility is a natural gas processing plant that was modified after August 23, 2011. Therefore, LDAR requirements for onshore natural gas processing plants would apply to equipment/processes that meet the applicability dates under Subpart OOOO. Due to the applicability dates, the Inlet and TXP3 processing train are subject to the LDAR requirements of this section. As noted above, processing trains TXP1 and TXP2 are subject to the LDAR requirements of 40CFR60 Subpart KKK.

The substantive LDAR requirements of Subpart OOOO for the Inlet and processing train TXP3, which includes the provisions referenced in 40 CFR 60, Subpart VVa, defines a leak (and triggers repair procedures) when pollutant concentrations are detected in excess of 500 ppmv (as opposed to 10,000 ppmv under Subpart KKK).

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the Ft. Beeler Natural Gas Processing Facility 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 (PM₁₀, and PM_{2.5}), and Sulfur Dioxide (SO₂). 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 programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) standards 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. OVM has identified the speciated HAPs in the following table as having a PTE in excess of 0.17 TPY. 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
Acetaldehyde	VOC	Yes	B2 - Probable Human Carcinogen
Acrolein	VOC	No	Inadequate Data
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen
Methanol	VOC	No	No Assessment Available
n-Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Ethylbenzene	VOC	No	Category D - Not Classifiable
Xylenes	VOC	No	Inadequate Data
2,2,4-Trimethylpentane	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 proposed modification does not meet the definition of a “major modification” pursuant to 45CSR14 and, therefore, an air quality impact (computer modeling) analysis was not required. Additionally, based on the nature of the proposed modification, modeling was not required under 45CSR13, Section 7.

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

The modifications evaluated herein were integrated into the existing monitoring, compliance demonstration, and reporting, and record-keeping requirements.

PERFORMANCE TESTING OF OPERATIONS

The modifications evaluated herein were integrated into the performance testing requirements.

CHANGES TO R13-2826I

The following substantive changes were made to Permit Number R13-2826I:

- The Emissions Units Table 1.0 was revised to reflect the changes evaluated herein;
- Requirements 7.1.1. and 8.11 were each revised to add a minimum DRE requirement for the flares;
- Tables 7.1.2(a) and 8.1.2(a) was revised by removing the VOC pass-through emission limits. Additionally, the combustion exhaust emissions of each flare were revised to reflect the increase in annual waste-gases flared;
- Tables 7.1.2(b) and 8.1.2(b) were added with the revised VOC pass-through emissions and the speciated HAP pass-through emissions; and
- Requirements 7.1.3. and 8.1.3. were revised to include more specific model and operating data of the flares; and

RECOMMENDATION TO DIRECTOR

The information provided in permit application R13-2826J indicates that compliance with all applicable federal and state air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of a Permit Number R13-2826J to Williams Ohio Valley Midstream, LLC for

Fact Sheet R13-2826J
Williams Ohio Valley Midstream, LLC
Ft. Beeler Natural Gas Processing Facility

the modifications discussed herein at the Ft. Beeler Natural Gas Processing Facility located near Moundsville, Marshall County, WV.



Joe Kessler, PE
Engineer

4-20-16

Date