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west virginia department of environmental protection

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## ENGINEERING EVALUATION/FACT SHEET

### BACKGROUND INFORMATION

Application No.: R13-2826K  
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: Class II Administrative Update  
Received Date: June 21, 2017  
Engineer Assigned: Joe Kessler  
Fee Amount: \$1,300  
Date Received: June 29, 2017  
Complete Date: July 11, 2017  
Due Date: September 9, 2017  
Applicant Ad Date: June 27, 2017  
Newspaper: *Moundsville Daily Echo*  
UTM's: Easting: 535.0 km Northing: 4,414.35 km Zone: 17  
Latitude/Longitude: 39.8783/-80.5907  
Description: Class II Administrative Update (A/U) to make various changes at the facility including: (1) Revising emissions from the new process flare (FL-02); (2) Revising various facility VOC/HAP emissions to reflect a smaller safety factor; (3) Removing the now obsolete old process flare (FL-01); and (4) Increasing the fugitive VOC/HAP emissions from component leaks by updating the facility component count.

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R13-2826A	8/17/10	Application Withdrawn.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 A/U 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.
R13-2826J	6/16/16	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 emissions based on updated gas analysis data, and (3) improving the calculation of speciated Hazardous Air Pollutant (HAP) emissions using updated protocols.

## 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 (C<sub>2</sub>H<sub>6</sub>) and most of the other hydrocarbons (primarily propane (C<sub>3</sub>H<sub>8</sub>) and butane (C<sub>4</sub>H<sub>10</sub>), with de-minimis amounts of hexane, benzene, toluene, ethyl-benzene, xylene, etc. (together C5+)), while maintaining methane (CH<sub>4</sub>) 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:

- Revising emissions from the new process flare (FL-02) as based on updated information on waste gases sent to the flare;
- Revising VOC/HAP emissions from a variety of facility emission sources (startup/shutdown/maintenance, rod packing, and process and piping fugitive leak emissions) to reflect a smaller safety factor (reduction from 100% to 20% in worst-case VOC/HAP constituency);
- Removing the now old process flare (FL-01) from the permit that is no longer used and will be disconnected from service; and
- Increasing the fugitive VOC/HAP emissions from component leaks by updating the facility as-built component count (and adding a safety factor of 15%).

### **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. James Jarrett on September 7, 2016. Based on that inspection, the facility was determined to be “Status 10 - Out of Compliance.” The primary issue was the exceedance of the flare volume limits which were subsequently revised under R13-2826J.

### **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.

#### ***Process Flare (FL-02)***

Two sources of air emissions occur at the flare (18E): VOC/HAP emissions that pass-through the flare uncombusted and the products of combusting the organic vapors sent to the flare for destruction. The combustion emissions from flaring are based on, where appropriate, emission

factors obtained from sections of AP-42 (Section 13.5: CO, Section 1.4: NO<sub>x</sub> and SO<sub>2</sub>, particulate matter, and some speciated HAPs). Emission factors taken from AP-42 Section 1.4 were scaled upward (by a factor of ~1.26) to reflect the higher heat content of the waste gas as per guidance. 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 an analysis of the waste gas (VOCs, Total HAPs, CH<sub>4</sub>) with a revised (lower) 20% safety factor. A 98% destruction and removal efficiency (DRE) was applied to the uncontrolled emissions of organic compounds to determine controlled VOC/HAP emissions. Hourly emissions were based on the maximum heat input combustion rate of the flare (460 mmBtu/hr). Annual emissions were based on flaring a maximum of 90.0 mmscf/yr of waste gas in the flare. A waste gas higher-heating value (HHV) of 1,290 Btu/scf was used in the calculations.

### ***Fugitive Emissions***

#### **Process and Piping Components**

OVM based their uncontrolled 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<sub>v</sub> leak definition and monthly monitoring (where applicable). VOC/HAP emissions were based on constituent material properties as measured in site-specific tests (or engineering estimates where unavailable) with a revised (lower) 20% safety factor. Component counts were based on "[u]pdated component counts from recent LDAR monitoring [with a] 15% contingency."

#### **Other Equipment Leaks**

OVM estimated fugitive leaks of natural gas from other potential sources such as leaks from both compressors' engine rod packing and crankcases (7E). VOC/HAP emissions were based upon vendor data and VOC/HAP by-weight percentages of the natural gas/propane that were based on actual gas analysis data with a (revised lower) 20% safety factor.

#### **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 (revised lower) 20% 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 changes at 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	R13-2826J <sup>(1)</sup>	R13-2826K <sup>(2)</sup>	Change
CO	93.51	89.15	-4.36
NO <sub>x</sub>	93.40	94.18	0.78
PM <sub>2.5</sub> /PM <sub>10</sub> /PM	7.20	7.09	-0.11
SO <sub>2</sub>	0.47	0.46	-0.01
VOCs	178.79	174.54	-4.25
Total HAPs	23.96	18.74	-5.22

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

(2) A detailed facility-wide emissions inventory is available in Attachment N of the permit application.

## **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 flare is defined as an "incinerator" under 45CSR6 and is, 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

Based on the flare's maximum capacity from the manufacturer, the new flare 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 3.43 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, the flare has a 20% limit on opacity during operation. Proper design and operation of unit should prevent any substantive opacity from the flare.

#### ***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 will increase the PTE of a regulated pollutant (see Table 2 above). However, the increase in PTE is below six (6) lbs/hour and ten (10) TPY of any regulated pollutant that would, pursuant to §45-13-2.17, define the change as a “modification” under 45CSR13. Therefore, pursuant to §45-13-4.2(b)(1), OVM is requesting a Class II Administrative Update to make a “[c]hange in a permit condition as necessary to allow changes in operating parameters, emission points, control equipment or any other aspect of a source which results in an increase . . . of any existing regulated air pollutant . . . “

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 June 27, 2017 in the *Moundsville Daily Echo* and the affidavit of publication for this legal advertisement was submitted on July 11, 2017.

#### ***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, SO<sub>2</sub>. The Ft. Beeler facility is not located in a tax district that is classified as “non-attainment” for SO<sub>2</sub>. 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***

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 40 CFR 60 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<sub>x</sub>), Ozone, Particulate Matter (PM<sub>10</sub>, and PM<sub>2.5</sub>), and Sulfur Dioxide (SO<sub>2</sub>). 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 effects 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](http://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.

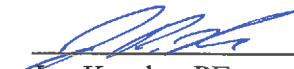
## CHANGES TO R13-2826J

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

- The Emissions Units Table 1.0 was revised to reflect the changes evaluated herein;
- Section 7.0 of the permit (dealing with the old process flare FL-01 was removed); and
- Emissions Tables under 8.1.2(a) and (b) were revised with updated emission limits for the flare (FL-02).

## RECOMMENDATION TO DIRECTOR

The information provided in permit application R13-2826K 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 R13-2826K to Williams Ohio Valley Midstream, LLC for the modifications discussed herein at the Ft. Beeler Natural Gas Processing Facility located near Moundsville, Marshall County, WV.

  
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Joe Kessler, PE  
Engineer

7/26/17  
\_\_\_\_\_  
Date

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