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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3359
Plant ID No.:	085-00018
Applicant:	West Virginia Oil Gathering, LLC
Facility Name:	Nutter Station
Location:	Ritchie County
SIC/NAICS Code:	5171/424710
Application Type:	Construction
Received Date:	February 16, 2017
Engineer Assigned:	Joe Kessler
Fee Amount:	$2,000
Date Received:	February 17, 2017
Complete Date:	February 23, 2017
Due Date:	May 24, 2017
Applicant Ad Date:	February 15, 2017
Newspaper:	*The Pennsboro News*
UTM's:	482.07 km Easting • 4,343.58 km Northing • Zone 17
Latitude/Longitude:	39.24134/-81.20777
Description:	After-the-fact construction of a Petroleum Liquids Storage and Transfer Station.

DESCRIPTION OF PROCESS

West Virginia Oil Gathering, LLC (WVOG), a subsidiary of EnLink Midstream LLC, has submitted a permit application for the after-the-fact construction and operation of a petroleum liquids storage and transfer station consisting primarily of a 630,000 gallon crude oil tank, a 188 horsepower (hp) 4-stroke rich burn (4SRB) natural gas-fired Cummins Model G855 reciprocating internal combustion engine (RICE), and associated loading operations and fugitive emissions. The facility is located in a rural area of Ritchie County approximately 3.52 miles northwest of Cairo, WV at the intersection of US Route 50 and State Route (SR) 31 and was originally constructed in 2006.

The Nutter Station receives crude oil solutions from surrounding gas and oil wells via tanker truck and pipeline. The fluids are stored in the 630,000 gallon crude oil storage tank (OTK-1) equipped with an internal floating roof. Additionally, there is one small diesel fuel tank (less than 10,567 gallons) located at the site.

Crude oil can be either trucked or piped into the facility. Typically, crude oil is removed from the facility via pipeline. In the event there is an issue with the pipeline, oil can also be loaded back onto tanker trucks (TL-1) from the tanks for removal from the site. Conservatively, the maximum annual throughput of crude oil is estimated to be 229,950,000 gallons.

Additionally, the site includes one (1) 188 hp 4SRB natural gas-fired Cummins Model G855 engine (ENG-1) used to supply power to the pump when electrical service is not available. This engine was manufactured on December 10, 2008 and is equipped with a non-selective catalytic reduction (NSCR) device to control the emissions of CO, NO_x, and VOCs.

SITE INSPECTION

Due to the nature of the permitting action, and the availability of a recent inspection by the DAQ, the writer did not conduct an additional site inspection for this permitting action. According to information in the DAQ database, the last full on-site inspection occurred on August 23, 2016 by Mr. James Robertson of the Compliance/Enforcement Section. This inspection found the facility be "Status 30 - In Compliance."

AIR EMISSIONS AND CALCULATION METHODOLOGIES

WVOG included in Attachment N of the permit application an emission estimate for the existing Nutter Station. The following will summarize the calculation methodologies used by WVOG to calculate the potential-to-emit (PTE) of the existing facility.

Storage Tanks

WVOG provided an estimate of the emissions produced from the crude oil storage tank (OTK-1) using the TANKS 4.09d program as provided under AP-42, Section 7 (AP-42 is a database of emission factors maintained by USEPA). This was the only storage tank on site determined to have the potential for any substantive emissions. The total emissions loss from a floating roof are the combination of the calculated "rim seal," "withdrawal," "deck fitting," and "deck seam" losses.

Conservatively, a maximum annual throughput of crude oil of 229,950,000 gallons (630,000 gallon tank turned over 365 times) was used in the calculations. WVOG doubled the calculated emission rate to account for any unknown variability in the makeup of the crude oil. The utilization of the internal floating roof on OTK-1 was considered in the calculations. Hazardous Air Pollutant (HAP) weight percentages (of total VOC emissions) were based on Table 11.3-2, "HAP Percent of VOC Emissions," Gasoline Marketing (Stage I and Stage II), EPA Document Revised Final 1/2001.

Truck Loadouts

Air emissions from crude oil loading operations (TL-1) 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, WVOG used variables specific to the liquids loaded and to the method of loading - in this case "submerged loading - dedicated normal service." Additionally, worst-case annual emissions were based on a maximum loading rate of crude oil of 2,950,000 gallons (one percent of total facility crude throughput). Note that under normal operations, truck loading of crude oil will not occur. It will only occur if there is a problem with the pipeline normal used to transport the oil. A maximum hourly pumping rate of 16,800 gal-crude oil/hour was used to determine the short term emission rate. HAP weight percentages (of total VOC emissions) were based on Table 11.3-2, "HAP Percent of VOC Emissions," Gasoline Marketing (Stage I and Stage II), EPA Document Revised Final 1/2001.

Engine

Potential emissions from the one (1) 188 hp 4SRB natural gas-fired Cummins Model G855 engine (ENG-1) was based on the applicable emission limits as given under 40 CFR 60, Subpart JJJJ, and as given in AP-42, Section 3.2 (AP-42 is a database of emission factors maintained by USEPA). As noted above the engine is equipped with a non-selective catalytic reduction (NSCR) device. Hourly emissions were based on the (as calculated using a fuel heat rating of 8,605 Btu/hp-hr) maximum design heat input (MDHI) of the engines of 1.62 mmBtu/hr and the maximum hp rating. Annual emissions were based on 8,760 hours of operation per year. The following table details the PTE of each compressor engine:

Table 1: Per-Compressor Engine PTE

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
CO	4.00 g/hp-hr (controlled)	Subpart JJJJ, Table 1	1.66	7.26
NO_X	2.00 g/hp-hr (controlled)	Subpart JJJJ, Table 1	0.83	3.63
$PM_{2.5}/PM_{10}/PM^{(1)}$	19.41×10^{-3} lb/mmBtu	AP-42, Table 3.2-3	0.03	0.14
SO_2	5.88×10^{-4} lb/mmBtu	AP-42, Table 3.2-3	0.001	0.004
VOCs	1.00 g/hp-hr (controlled)	Subpart JJJJ, Table 1	0.41	1.82
Total HAPs	Various	AP-42, Table 3.2-2	0.05	0.22
Formaldehyde(1)	2.05×10^{-2} lb/mmBtu	Catalyst Vendor	0.03	0.15

(1) Includes condensables.

Fugitives

WVOG based their VOC fugitive equipment leak calculations (leaked from from valves, connectors, flanges, etc.) 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, were applied. Component counts were given and shall be limited in the draft permit. Conservative VOC by-weight percentages of 100% were used in the calculations.

Haul Roads

WVOG included in their application an estimate of fugitive emissions created by truck traffic unloading and removing liquids from the tanks. As all the roadways around the station are unpaved, WVOG used the equation given in Section 13.2.2 of AP-42 and appropriate variables to estimate potential emissions.

Emissions Summary

Based on the above estimation methodology, the facility-wide emissions of the Nutter Station is given in the following table:

Table 2: Nutter Facility-Wide Potential-to-Emit (PTE)

Source	CO		NO_x		PM		SO_2		VOCs		HAPs	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Storage Tank	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08	4.72	0.06	0.25
Truck Loading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	2.25	1.79	0.12
Engine	1.66	7.26	0.83	3.63	0.03	0.14	0.01	0.01	0.41	1.82	0.05	0.23
Leak Fugitives	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.59	0.00	0.00
Haul Roads	0.00	0.00	0.00	0.00	2.24	9.80	0.00	0.00	0.00	0.00	0.00	0.00
Facility-Wide Totals	1.66	7.26	0.83	3.63	2.27	9.94	0.01	0.01	2.14	9.38	1.90	0.60

(1) PM emissions are total PM and include condensables where applicable. Lower emission rates of $PM_{2.5}$ and PM_{10} are produced from haulroads but were not included for simplicity.

REGULATORY APPLICABILITY

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

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 Nutter Station has a maximum uncontrolled (without operational limits) emission rate of a regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY and, additionally, the facility is "subject to [a] substantive requirement [Subpart Kb and Subpart JJJJ] of an emission control rule promulgated by the Secretary." 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." WVOG is required to obtain an after-the-fact permit under 45CSR13 for the after-the-fact construction and operation of Nutter Station.

As required under §45-13-8.3 ("Notice Level A"), WVOG placed a Class I legal advertisement in a "newspaper of *general circulation* in the area where the source is . . . located." The ad ran on

February 15, 2017 in *The Pennsboro News* and the affidavit of publication for this legal advertisement was submitted on February 21, 2017.

45CSR14 (NON APPLICABILITY)

The facility-wide PTE of Nutter Station (see Table 1 above) is below the levels that would define the source as "major" under 45CSR14 and, therefore, the facility evaluated herein is not subject to the provisions of 45CSR14.

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 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. However, as there is an emissions source at the facility subject to requirements promulgated under §111 or §112(r) of the Clean Air Act (specifically 40 CFR 60, Subpart Kb) that does not have a specific exemption from Title V permitting, the facility is considered a non-major "area" source subject to Title V. Sources in this classification (also known as "deferred sources") are deferred from a requirement to get a Title V permit.

40 CFR60, 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

Subpart Kb of 40 CFR 60 is the NSPS for storage tanks containing Volatile Organic Liquids (VOLs) which construction commenced after July 23, 1984. The Subpart applies to storage vessels used to store volatile organic liquids with a capacity greater than or equal to 75 m^3 (19,813 gallons). However, storage tanks with a capacity greater than or equal to 151 m^3 (39,890 gallons) storing a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa) or with a capacity greater than or equal to 75 m^3 but less than 151 m^3 storing a liquid with a maximum true vapor pressure less than 15.0 kPa are exempt from Subpart Kb. Note that this facility is located after the custody transfer and is, therefore, not eligible for the exemption given under §60.110b(d)(4). Therefore, based on the above, the 630,000 gallon (2384.81 m^3) crude oil (~ 35 kPa) storage tank (OTK-1) is subject to the applicable provisions therein.

The substantive requirement for the crude oil tank, as relevant to OTK-1, is given under §60.112b(a), which applies to the "owner or operator of each storage vessel either with a design capacity greater than or equal to 151 m3 containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 5.2 kPa but less than 76.6 kPa . . .," is for the storage tank to be equipped with a an internal floating roof meeting the requirements given under §60.112b(a)(1)(i) though (ix). The applicable crude oil tank at the Nutter Station is equipped with an internal floating roof.

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

WVOG's 188 hp, 4SRB natural gas-fired Cummins Model G855 engine located at Nutter Station is defined under 40 CFR 60, Subpart JJJJ as a stationary spark-ignition internal combustion engine (SI ICE) and is, pursuant to §60.4230(a)(4)(iii), subject to the applicable provisions of the rule. Pursuant to §60.4233(e): "Owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards in Table 1 to this subpart for their stationary SI ICE." Therefore, as the existing WVOG engine is greater than 100 hp, it must comply with the emission standards under Table 1 for "Non-Emergency SI ICE 100≤HP≤500 hp manufactured after July 1, 2008:" NO_x - 2.0 g/HP-hr, CO - 4.0 g/HP-hr, and VOC - 1.0 g/HP-hr. The emission standards and the proposed compliance therewith of the engines are given in the following table:

Table 3: Cummins Model G855 Subpart JJJJ Compliance

Pollutant	Standard (g/HP-hr)	Uncontrolled Emissions (g/bhp)(1)	Control Percentage (1)	Controlled Emissions (g/bhp)(1)	JJJJ Compliant?
NO_x	2.0	5.90	66.10%	2.00	Yes
CO	4.0	26.70	85.02%	4.00	Yes
VOC	1.0	1.90	47.37%	1.00	Yes

(1) Uncontrolled emissions are based on the vendor data sheet supplied in the permit application. Controlled emissions are based on the Subpart JJJJ standard. Control percentages are calculated.

The Cummins Model G855 engine is not a "certified" engine under Subpart JJJJ so WVOG will have to show compliance with the emission standards pursuant to §60.4243(b)(2)(ii): conducting an initial performance test and thereafter conducting subsequent performance testing every 8,760 hours or 3 years, whichever comes first, to demonstrate compliance. Performance testing requirements are given under §60.4244 of Subpart JJJJ. EQT will additionally have to meet all applicable monitoring, recording, and record-keeping requirements under Subpart JJJJ.

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 Nutter Station is defined as an area source of HAPs (see Table 2), the facility is subject to applicable requirements of Subpart ZZZZ. Pursuant to §63.6590(c):

> An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part.

§63.6590(c)(1) specifies that "[a] new or reconstructed stationary RICE located at an area source" is defined as a RICE that shows compliance with the requirements of Subpart ZZZZ by "meeting the requirements of . . . 40 CFR part 60 subpart JJJJ, for spark ignition engines." Pursuant

to §63.6590(a)(2)(iii), a "stationary RICE located at an area source of HAP emissions is new if [the applicant] commenced construction of the stationary RICE on or after June 12, 2006." The existing engines located at the Nutter Station is defined as a new stationary RICE (application states manufacture date of engines is December 2008) and, therefore, WVOG will show compliance with Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart JJJJ. Compliance with Subpart JJJJ is discussed above.

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from Nutter 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_{10} and $PM_{2.5}$), 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 following table lists each HAP identified by WVOG with facility-wide emissions above 0.05 TPY (100 lbs/year) and the associated carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 2: HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
n-Hexane	VOC	No	Inadequate Data
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	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 facility 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 maximum throughput limit of crude oil set forth in 4.1.2 of the draft permit, WVOG shall be required to monitor and record the monthly and rolling twelve month total of crude oil (in gallons) throughput in the storage tank; and

- For the purposes of demonstrating compliance with the truck loadout limit set forth in 4.1.3(b)of the draft permit, WVOG shall be required to monitor and maintain monthly and rolling twelve month records of the amount of crude oil loaded into tanker trucks.

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, WVOG shall be required to conduct test(s) to determine compliance with the emission limitations established in this permit and/or applicable regulations; and

- The permittee shall meet all applicable performance testing requirements for ENG-1 as given under 40 CFR 60, Subpart JJJJ.

RECOMMENDATION TO DIRECTOR

The information provided in permit application R13-3359 indicates that compliance with all applicable state and federal air quality regulations should be achieved. Therefore, I recommend to the Director the issuance of Permit Number R13-3359 to West Virginia Oil Gathering, LLC for the after-the-fact construction and operation of the Nutter Station located in Ritchie County, WV.

Joe Kessler, PE
Engineer

2/27/17
Date