



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

MEMORANDUM

To: Bev McKeone
From: Jerry Williams *g*
Date: June 8, 2016
Subject: PD16-036, HEP Shalewater Solutions, LLC (HEP) Morris Facility
(033-00261)

HEP submitted PD16-036 on May 23, 2016. PD16-036 was submitted to request a permit determination for a brine water treatment and recycling facility. Emissions from this facility consist of working and breathing losses from 2-21,000 gallon weir tanks, 5-21,000 gallon settling tanks, 1-21,000 polishing tank, 5-21,000 gallon sludge storage tanks, 4-diesel fired engines and water and sludge loading/unloading emissions.

45CSR13 Section 2.19 defines “potential to emit” as the maximum design capacity of a stationary source or emissions unit to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source or emissions unit to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is enforceable by the Secretary and U. S. EPA in any permit or consent order. Secondary emissions shall not be included in any determination of a stationary sources potential to emit.

45CSR13 Section 2.19 defines “stationary source”, for the purpose of this rule, any building, structure, facility, installation, or emission unit or combination thereof, excluding any emissions unit which meets or falls below the criteria delineated in Table 45-13B, which:

- Is subject to any substantive requirement of an emission control rule promulgated by the Secretary;
- Discharges or has the potential to discharge more than six (6) pounds per hour and ten (10) tons per year, or has the potential to discharge more than 144 pounds per calendar day, of any regulated air pollutant;
- Discharges or has the potential to discharge more than two (2) pounds per hour or five (5) tons per year of hazardous air pollutants considered on an aggregated basis;

- Discharges or has the potential to discharge any air pollutant(s) listed in Table 45-13A in the amounts shown in Table 45-13A or greater; or
- An owner or operator voluntarily chooses to be subject to a construction or modification permit pursuant to this rule, even though not otherwise required to do so.

According to this submittal, HEP estimates the emissions from this facility to be the following:

Pollutant	Hourly PTE (lb/hr)	Annual PTE (ton/year)
Particulate Matter-10	0.64	2.80
Volatile Organic Compounds	0.18	0.80
Carbon Monoxide	3.80	16.80
Nitrogen Oxides	2.30	9.80
Sulfur Dioxide	0	0
Total Hazardous Air Pollutants	0.004	0.019

However, after review of the information submitted, it is my belief that HEP's Morris Facility does meet the definition of a stationary source based on the product loading/unloading emissions alone. Additionally, there is a high level of uncertainty of the information submitted with this permit determination, including the working/breathing losses of the tanks and the combustion emissions from the diesel engines.

USEPA has developed an equation to estimate the emissions from loading petroleum liquids. This equation can be found in Chapter 5.2 (Transportation and Marketing of Petroleum Liquids). The equation estimates the volatile organic compounds (VOCs) loading loss using a saturation factor (mode of operation), true vapor pressure of the liquid loaded (psia), molecular weight of the vapors (lb/lb-mole), and temperature of the bulk liquid loaded (°R).

The formula is: $L_L = (12.46 * S * P * M) / T$

The loading loss (L_L) represents the loading loss of VOCs per 1000 gallons of liquid loaded.

Because this facility does not currently have a permit which limits or prescribes the loading, type of loading, or other operational parameters, the potential to emit must be determined on the maximum design capacity. According to HEP, based on the loading rate of the trucks and connections, the water loading rate is 420,000 gallons per day and sludge loading rate is 84,000 gallons per day. This loading rate would serve as the maximum rate. In regards to the saturation factor, since no permit term exists, the maximum saturation factor must be used to determine potential to emit. This would constitute splash loading, which results in an S factor of 1.45. The molecular weight of 22 lb/lb-mole provided by HEP is representative of material from this area. In regards to the temperature, the highest level of emissions will occur when the temperature is the lowest. Therefore, based on this area, this would occur in January when the average liquid surface temperature was estimated to be 52.97 °F (512.64 °R). The maximum vapor pressure would be 0.3644 psia. HEP claims that the water is a mix of 25% flowback, 40% produced, and 35% contaminated surface water. However, it should be assumed that the influent water is 100% produced water as it would have the highest percentage of VOCs.

Therefore, the water liquid loading rate would be:

$$L_L = (12.46 * 1.45 * 0.3644 * 22) / 512.64$$
$$L_L = 0.2825 \text{ lb VOC} / 1,000 \text{ gallons loaded}$$

Utilizing a daily loading rate of 840,000 gallons per day results in emission rates of:

$$\text{Daily emission rate} = (0.2825 \text{ lb VOC} / 1,000 \text{ gallons loaded}) * 420,000 \text{ gallons per day}$$
$$\text{Daily emission rate} = 118.66 \text{ lb/day of VOC}$$

$$\text{Hourly emission rate} = 118.66 \text{ lb/day of VOC} * (1 \text{ day} / 24 \text{ hours})$$
$$\text{Hourly emission rate} = 4.94 \text{ lb/hr of VOC}$$

$$\text{Annual emission rate} = 4.94 \text{ lb/hr of VOC} * (1 \text{ ton} / 2,000 \text{ lb}) * (8,760 \text{ hr} / 1 \text{ year})$$
$$\text{Annual emission rate} = 21.66 \text{ tons per year of VOC}$$

Utilizing a daily sludge loading rate of 84,000 gallons per day results in emission rates of:

$$\text{Daily emission rate} = (0.2825 \text{ lb VOC} / 1,000 \text{ gallons loaded}) * 84,000 \text{ gallons per day}$$
$$\text{Daily emission rate} = 23.73 \text{ lb/day of VOC}$$

$$\text{Hourly emission rate} = 23.73 \text{ lb/day of VOC} * (1 \text{ day} / 24 \text{ hours})$$
$$\text{Hourly emission rate} = 0.99 \text{ lb/hr of VOC}$$

$$\text{Annual emission rate} = 0.99 \text{ lb/hr of VOC} * (1 \text{ ton} / 2,000 \text{ lb}) * (8,760 \text{ hr} / 1 \text{ year})$$
$$\text{Annual emission rate} = 4.33 \text{ tons per year of VOC}$$

The overall VOC loading rate would be 5.93 lb/hr and 25.99 tons/year.

Therefore, based on the liquid loading emissions only, the facility would nearly meet the definition of a "stationary source" in regards to VOC emissions. Factoring in the four (4) diesel engines and the working and breathing losses from 13-21,000 gallon storage tanks, the facility would exceed 6 lb/hr, 10 ton/year and 144 lb/day of VOC emissions on an uncontrolled basis.

HEP utilized EPA TANKS 4.09 to estimate the working and breathing losses from the storage tanks. In regards to these storage tank losses, it is my opinion that the input information is incorrect. For example, the storage tanks indicate that the overall molecular weight is 18.03 lb/lb-mole. This is not representative of produced water from this area.

The working and breathing losses for the storage tanks were not officially analyzed due to the loading emissions from the facility already subjecting them to permitting and inconsistencies with similar liquids from this area. Furthermore, there are inconsistencies in the diesel engine emission calculations and the certificate of conformities. The permit determination form indicates that all engines are certified, but certifications were not included for all engines.

Additionally, WATER9 may be a more appropriate method for estimating these emissions. WATER9 is a wastewater treatment model developed by EPA for estimating air emissions of individual waste constituents in wastewater collection, storage, treatment, and disposal facilities.

It contains a database listing many of the organic compounds and procedures for obtaining reports of constituent fates, including air emissions and treatment effectiveness.

WATER9 provides separate emission estimates for each individual compound that is identified as a constituent of the wastes. The emission estimates are based upon the properties of the compound and its concentration in the wastes. To obtain these emission estimates, the user must identify the compounds of interest and provide their concentrations in the wastes. The identification of compounds can be made by selecting them from the database that accompanies the program or by entering new information describing the properties of a compound not contained in the database.

WATER9 has the ability to use site-specific compound property information, and the ability to estimate missing compound property values. Estimates of the total air emissions from the wastes are obtained by summing the estimates for the individual compounds.

Based on the emissions from the facility exceeding stationary source thresholds, it is my opinion that a construction permit is required for PD16-034.